

Report

Meeting with 5th graders

On May 18 and 19, 2004 architects from Line and Space guided by science teacher Laura Flynn and accompanied by BLM Southern Nevada Associated Director, Angie Lara and Project Coordinator, Michael Reiland as well as Core Member Blaine Benedict (May 18th, only) met with five 5th grade classes located among three different schools (Miller, Hancock and CP Squire) to discuss their vision of the new environmental school at Oliver Ranch. The classes were diverse and the schools ranged from an international magnet school to one considered “low SES”. Uniformly, the children were well mannered and participatory.

The 5th graders had knowledge of Red Rock Canyon (the context of the new environmental school) and were enthusiastic about the prospects of exploring and learning about the environment, in the environment.

There was no obvious distinction among the children from the varied schools in their preferences as related to the new project.

In general the students:

- Seemed to be in favor of larger sleeping rooms; 6-8 children instead of 4-6. In some classes there was more or less a 50/50 split on this issue.
- Were evenly divided over preference for bunk beds vs. one level beds although there was unwavering unanimity when alternative sleeping possibilities such as sleeping in hammocks was suggested.
- Favored windows that would allow them to see out from their sleeping areas including the night sky; one or two were worried about people being able to see in.
- Suggested group meeting/ working areas within their bunk group including large table/chairs, bean bags and other types of comfortable seating, a nook, book shelves, computers, etc. .
- Wanted privacy for showering and toilet use.
- Were concerned about not having TV.
- Articulated the need for choices in terms of indoor and outdoor learning and eating possibilities. When it was offered that outdoor experiences would occur during nice weather they were more uniformly in favor of the concept.
- Were enthusiastic about campfires and associated night time activities.
- Offered a broad range of naming suggestions (Mohave Science School, Opportunity Center, Mohave Center, etc.) but were uniformly receptive to the idea of a name that related to the Paiute Indians

Specific suggestions that occurred more than once included providing telescopes, meeting “pits” and special windows (including fresh air) in the bedrooms, a greenhouse, camping out and having good food. A place to play sports was mentioned.

One particularly provocative suggestion was that computers would “allow the kids at the Science School to talk with other classes that were not able to be at the facility”. Another stated, “draw what you see, then you will have a souvenir to take home”; and, an extremely perceptive young person volunteered to develop his idea for flushing toilets with grey water.

The concept of competing among groups to determine who could conserve the most water was popular with everyone except for the rare individual who “needs to take three showers a day!”

Oliver Ranch School

Line and Space, llc 627 East Speedway Blvd. Tucson AZ 85705 520.623.1313

Interpretive Planning Workshop Report ♦ April 20-30, 2004

Introduction

Interpretive planners from Hilferty & Associates (H&A) joined architects from Line & Space (L&S), staff and stakeholders from the Bureau of Land Management (BLM), and members of the public in a series of workshops to articulate and clarify the mission, vision, audience, messages, themes, programmatic requirements, and interpretive opportunities for the Red Rock Canyon Visitor Center, Wild Horse and Burro adoption facility, and Oliver Ranch residential environmental education school. Workshops took place on the campus of the University of Nevada-Las Vegas and at Oliver Ranch. BLM staff provided content experts who led sessions focusing on the geology, climate, hydrology, ecology, wildlife, and history of the region.

Spread out over the course of two consecutive weeks, workshops were structured to move from looking at the larger context of southern Nevada to examining specific needs at the RRCNCA. The first two days of Week 1 focused on RRCNCA overall message and theme distribution and how that integrates with what has become known as the “String of Pearls,” a series of environmental preserves and recreational/educational nature opportunities that share thematic and programmatic elements with the planned facilities at RRCNCA. Sessions focused on how interpretive themes and messages might complement environmental experiences elsewhere in southern Nevada. The second half of Week 1 focused on particular goals, opportunities, and requirements at the Wild Horse and Burro adoption facility. Week 2 focused entirely on similar goals, opportunities, and requirements at the Oliver Ranch residential environmental education center.

The following report highlights key issues discussed at the workshops and includes recommendations for interpretive opportunities that might be explored in future planning sessions. Attached appendices include raw data collected during workshop sessions, as well as diagrams on which workshop participants were asked to vote their preferences regarding such issues as audience and thematic messages.

String of Pearls

Southern Nevada is blessed with a plethora of nature destinations—Spring Mountain Ranch State Park, Spring Mountain National Recreation Area, Desert National Wildlife Refuge, Lake Meade National Recreation Area, Valley of Fire State Park, Red Rock Canyon National Conservation Area, Las Vegas Springs Preserve, Walking Box Ranch—within close proximity to a large, rapidly growing metropolitan area. The close proximity of the city to these sites affords millions of potential visitors opportunities to experience and enjoy these environments, learn about their complex and fragile ecosystems, and participate in their ongoing management and

preservation. The latter message is significant when one considers that Las Vegas is one of the fastest growing cities in the United States with many new residents arriving with little knowledge of desert ecosystems. As the demand for water exceeds available supply, it becomes critically important that residents bring their behaviors in line with the constraints of the environment, that they adopt more responsible practices and become stewards of the place they have come to call home.

Through legislation such as the Southern Nevada Public Lands Management Act, various public agencies are engaged in ambitious and laudable endeavors that promote environmental stewardship through conservation initiatives, capital improvement on public lands, and improved public access to those lands via parks, trails, and other avenues. The BLM's plan to make improvements at the Red Rock Canyon National Conservation Area dovetails nicely with these other existing or planned facilities. Their close proximity to the NCA suggests that careful coordination between the various entities might result in complementary experiences for visitors that reinforce common goals and messages while achieving some economy by removing the pressure for each site to be all things to all visitors. Cooperation also brings the added benefit of widening the potential audience for each site, thereby increasing the base of support for future endeavors.

Several collaborative opportunities became apparent during the workshop discussions that might be further explored in the coming months.

- **Joint Ticketing & Membership**—Since each of these nature destinations may likely attract audiences with similar interests, joint ticketing and membership opportunities may serve as an incentive for many to visit multiple destinations each year. Individual venues will realize an increase in annual revenues while visitors will perceive that they have reaped some savings from purchasing a multi-destination pass. Joint membership opportunities similarly have the potential to draw more stakeholders in the ongoing life of each site, better positioning each to undertake future improvements that promote stewardship.
- **School Curricula**—School children in the Las Vegas region can benefit from close collaboration between the String of Pearls sites by close coordination with the K-12 school curricula. Students will experience different aspects of the regional environment as they progress through the school system. Individual venues can cater specific programs, best told at their location, to reinforce specific grade-level curricula. As a result, by the time they reach high school, students will have visited all or nearly all of the sites, learning about many different aspects of the regional desert environment while getting common stewardship messages from all. Individual venues benefit by not having to tailor programs to all grade levels; they can spend less and yet be more effective in communicating messages to specific target audiences.

- String of Pearls Marketing & Site Exhibits—Common marketing materials—a String of Pearls newsletter or magazine, media advertising, web site, or even a monthly calendar that gets inserted into the mailings of each partner—offer the opportunity for each venue to reach a larger, more diverse audience while sharing the costs. A freestanding exhibit element, perhaps in the form of a touchscreen kiosk or interactive topographic map, might appear at each venue. Visitors would come to recognize them as they toured each facility. They would enable visitors to locate themselves in relation to the other sites and learn what opportunities are available to them at each site. Software programming might invite them to type in e-mail addresses to have information about individual sites sent to them. The exhibit might also include a reward component for kids—perhaps encouraging them to collect a series of artistically rendered stamps to add to a String of Pearl passport book; filling the book with all stamps might make them eligible for an additional reward opportunity.

Red Rock National Conservation Area (3 sites)

- Audience—In discussions about the three sites, it became readily apparent that the Red Rock Canyon Visitor Center would accommodate the largest and most diverse audience, while the Wild Horse and Burro Adoption Facility and the Oliver Ranch Environmental Education Center will target more selective audiences in order to reduce the impact of visitors on those site and streamline the program requirements.

Visitors to the RRCNCA come from all over the world (60% from outside Nevada, 10% foreign) and range in age from school children to seniors. As a major tourist destination, Las Vegas draws visitors from throughout the United States and many foreign countries, and many of those visitors are finding their way to Red Rock Canyon. The number of foreign language speakers suggests that future interpretation include information in English, Spanish, and possibly one or two Asian languages.

Many visitors make use of the hiking trails and rock-climbing opportunities, and yet a fair number appear to confine their visit to driving the scenic road and touring the visitor center (perhaps owing to extreme temperatures during the summer months). Clearly the Calico Hills are a striking feature of the visitor experience. The need to balance exterior and interior opportunities seems to suggest a Visitor Center building or series or connected buildings that move visitors seamlessly from enclosed conditioned spaces to shaded, semi-conditioned spaces. Architecture and exhibits should work together to blur distinctions between interior and exterior spaces. Some exhibits will be specifically designed for outdoor use.

As mentioned above, Las Vegas is growing at a rapid pace. The presence of large numbers of new residents from outside the desert region coupled with visiting tourists warrants a strong emphasis on interpretation that helps visitors appreciate the complexity and fragility of desert ecosystems while conveying messages of respect and stewardship.

- **Subject**—A listing of the many subjects suggested by workshop participants appears in the appendix to this report. The list is by no means definitive; future planning and research will flesh out specific topics and fill in gaps.

Water is an obvious topic with many possible avenues of exploration—deep and shallow aquifers and recharge, role in creating micro-habitats at various elevations, adaptation to drought conditions by various species, seasonal rains, in micro-biotic crust, violence and erosive properties of flash floods, historic role in regional trade and settlement patterns, annual usage levels by regional residents, sustainable levels of use.

Geology is a story that cries out to be told as visitors approach the dramatic Calico Hills. Geological stories relate to the formation of this landscape, the huge scale of geologic time, the wind-swept sand dunes, the specific thrust fault that resulted in older limestone capping and thereby preserving younger sandstone, evidence of past ecosystems that exist in the fossil record, the nature of the aquifers, regional mining history, and rock art that evidences human habitation for many centuries.

Microhabitats are a surprising story of the Mojave Desert. Many visitors, with untrained eyes, will not perceive the diversity of species that exist at different elevations and in different sections of the RRCNCA. BLM presenters emphasized species diversity of the region and the many strategies used by different species to adapt to drought conditions (escapers, evaders, resisters). Staff presenters emphasized the micro-biotic crust—its role in holding moisture and enabling seed germination, and its fragility and long recovery time when broken.

Human interaction with the landscape has taken place for thousands of years, evidenced by petroglyphs, painted rocks, and archaeological fire pits and artifacts. Water and the presence of underground springs have tended to play a strong role in both migration and settlement patterns. The Southern Paiute have a strong connection to the land that is evidenced by their origin stories. Many areas of the RRNCA show evidence of a managed landscape.

Wild horses and burros have a kind of star power in this region. They conjure widely held romantic notions of the American West. Many international visitors express their enthusiasm for seeing these long-time residents, reintroduced to the Americas by European immigrants. Due to

perceived audience appeal and the need to mediate public access to the adoption facility, a major portion of the Visitor Center exhibits should interpret the history of wild horses and burros living on the landscape, the BLM's historic and ongoing management practices, and potential adoption opportunities. The Visitor Center will also accommodate the desirability of having mascots on the site for supervised visitor interaction.

Astronomy is a final topic of exploration at the Visitor Center and Oliver Ranch. Owing to the quality of the night sky, a recent astronomy program drew some 400 visitors to the Center. Astronomical observations will enable visitors to observe the evolving cosmos during different times of year, and interpretation might include regional Native American interpretations of the night sky. Public observations will take place at the Visitor Center while 5th graders will do curricula based activities at Oliver Ranch.

- **Message**—Workshop participants engaged in a brainstorming exercise to identify core messages that might be conveyed by all three RRCNCA facilities. They were then asked to vote (using dots) for their favorites; the resulting diagram appears in the appendix. There were many strong and imaginative messages that were suggested. Several common themes can be inferred.

Respect and stewardship are obvious messages—the age and fragility of desert ecosystems, the need to balance human needs with the needs of the environment. Messages carried the implicit notion that visitors' actions have an impact both positive and negative. Some messages extended the invitation to visitors to get involved (“It’s your land, lend a hand.” “My actions cause reactions.” “Sustain the desert. Sustain ourselves.” “500 Million Years in the Making, Extend the Lifespan”).

Discovery—Many messages emphasized the uniqueness of the ecosystem that visitors could discover (“See nature’s neon.” “Explore the secret life of water.” “Get ‘Outside’ Vegas!” “Discover the desert.” “100% natural, 100% native.”). A related message highlighted the reflective/spiritual nature of the place—the idea that many folks find respite there (“Find yourself at Red Rock.”).

A few messages emphasized particular segments of the story. “Get your ass out of here” was clearly geared toward potential wild horse and burro adopters. “Don’t bust the crust” referred to the fragility of the micro-biotic crust.

- **Measurements of Success**—Workshop participants were asked to complete the following sentence: “One year after opening, we will know that we have succeeded because ...” On many projects, the obvious answers

Red Rock Canyon National Conservation Area

offered by clients include increased visitation or increased revenue. In this case, most responses were more attuned to effecting visitor behaviors. Again, encouraging respect and stewardship were primary. Respondents placed a high priority on educating young people—if young people grow up in a climate that emphasizes responsible living that they will be more likely to be good stewards as adults.

The necessity of monitoring such a change over a long time span suggests that, as planning proceeds, some thought be given to systems that might be employed to monitor long-term visitor behaviors. Interpretive components at the facilities might be designed to nurture long-term relationships with visitors. Interactive audiovisual programs might be tailored to have secondary web components so that visitors can continue their experience from home. Interactive quizzes might query visitors about their knowledge of desert ecosystems and personal behaviors; visitor responses could present data for longitudinal studies of visitor knowledge, attitudes, and behaviors. Ongoing scientific research might be presented in exhibit experiences, allowing visitors to understand not just the history of the RRCNCA, but also participate in its ongoing evolution.

Interpretive Opportunities

Red Rock Canyon Visitor Center

Workshop participants discussed the quality of the visitor experience to be offered at each of the RRCNCA facilities. Key words describing the experiences include multi-sensory, interactive, fun, accessible, inspiring, open-ended. Interpretation should facilitate a deeper understanding and connection to the environment. At all three facilities, interior and exterior spaces will be seamlessly connected so that visitors move easily between the two. Interpretive experiences will work with the building architecture to model sustainability.

Specific interpretive experiences at the Visitor Center will be addressed later this year in future planning sessions. However, from the general discussions about the three facilities, some ideas have already begun to emerge.

- Visitors are coming to the RRCNCA to experience this extraordinary environment, and yet bring with them diverse backgrounds and skills. By blurring interior and exterior spaces in the Visitor Center—having some exhibits inside, some outside, and some in shaded, semi-enclosed/conditioned spaces, the Center will maximize the connection that visitors may have with the environment, while affording them some respite from the elements when desired.
- As noted above, water, geology, microhabitats, wild horses and burros, human interaction with the environment, and astronomy are significant topics that warrant space in the exhibits.

Wild Horse & Burro Adoption Facility

The Wild Horse & Burro Adoption Facility will not be open to the general public on a walk-in basis but will target those individuals who may be interested in adopting an animal. Interpretation at the Red Rock Canyon Visitor Center will tell a much more complete story of the wild horse and burro, their historic reintroduction and expansion in North America, their impact on the American West, the BLM strategy for managing the herds, and opportunities for potential adopters.

Interpretive opportunities at the Adoption Facility itself should be geared toward potential adopters. Interpretive panels might aid in orientation by introducing the program and taking visitors through the steps in the process. A short orientation film might be used to present success stories and help adopters understand the tasks and challenges that they may encounter. Additional interpretive panels, perhaps designed to be movable, might be displayed in the arena during auctions or other special events. Traveling trunk exhibits might also be designed as display and education tools for staff, visiting schools, or groups to generate awareness about the adoption program. Many of the above interpretive elements might draw from

materials developed for the Visitor Center exhibits in order to realize some cost savings.

The popularity of the wild horse as an icon of the American West suggests that the facility might encounter increasing demands from individuals and groups wishing access. Current staffing and programmatic requirements do not envision access to the general public. However, it might be prudent to site and design the building to facilitate expansion should that be a desirable option in the future.

Oliver Ranch Environmental Education Center

During the meetings at Oliver Ranch, significant discussion and feedback indicated a desire to explore a number of opportunities for interpretive elements at the school. The expressed vision and purpose of the Oliver Ranch School relates to interpretation in a number of ways. On the majority of the site, the desert should speak for itself, and interpretation should be through hands-on instruction. In keeping with the idea of minimal structural and visual impact on the site, interpretation will be integrated with other structures including the school buildings, greenhouse, observatory, and shade/learning structures. Interpretive elements might also be structured to serve as teaching tools for instructor use during the learning experiences.

Examples of interpretive/themed elements of shade structures

- geologic cross section
- plant type outlines
- birding (migratory map)
- water table
- compass elements such as GPS and mapping sightline points showing map and coordinates
- structures could represent different desert animal homes; a burrow, a nest, an ant colony

A significant opportunity exists for interpretation of the architecture and operations of school buildings themselves, as they will be examples of sustainability and desert adaptation. Construction methods, materials, shading, water and energy systems can all be interpreted in ways that tie directly to the student experiences in the desert and will serve to reinforce environmental science curricula.

The idea of quantifying and tracking of resource usage and environmental impact at Oliver Ranch was brought up frequently by a number of stakeholders. Students might take part and even compete with each other in the collection of the pertinent data. Current PDA technology might be employed that allows students to record data and communicate with each other and their instructors. PDAs could also be used as

information repositories for science curricula, negating the need to produce paper resources. This digital processing and storage of information also facilitates pre- and post-visit curricular activities. It is also desirable to have the ability to access individual and cumulative data sets both at Oliver Ranch and remotely for use in the classroom and by other entities with interest in the results generated.

Some of the data to be tracked could include:

- Individual and group energy consumption
- Individual and group water usage
- Recycled material volumes
- Inventories/surveys of plant and animal species
- Water table fluctuations
- Meteorological observations

A designated space for astronomical observations and night studies by students will also create additional interpretive opportunities, including Native American astronomy/cosmology, and desert night sounds interpretation.

Additional sustainability examples with exhibit potential include the following.

- Transparent waste and recycling containers “Recyclables can be beautiful.”
- Visible examples of energy efficiency
- Interpret the thermal mass of the walls and insulation
- Interpret the shading of the building
- Interpret the use of recycled materials in the structures, i.e. imploded casino materials
- Expose operating systems, utilities, ductwork, etc.
- Compare human habitation impact versus native animals impact.
- Real-time energy and water measurements and continuum of data collection
- Pump to fill your own water tanks for showers
- Use a simple numbering system throughout the site to illustrate energy usage; an LED flashlight would be 2 while a regular flashlight may be 25.

Additional interpretation could include the following.

- The cultural history of site – timeline
- Cafeteria use of indigenous plants in school diet – Edible plant graphics

Red Rock Canyon National Conservation Area

- Interpretive program during transport

The following spaces might feature interpretive elements: entry, gift shop, gear room, laundry, restrooms, showers, dining, recycling/trash, loading/trash, flex labs (indoor and outdoor), greenhouse, weather station, traveling exhibit space, outdoor classroom gathering areas.

Trip Summary

Red Rock Canyon National Conservation Area

Tuesday, May 25th

8:30pm – 9:15pm

Oliver Ranch site visit

Attendees

Ramona Sakiestewa, cultural consultant
Andy Merrell, cultural consultant
Les Wallach, Line and Space, llc
Bob Clements, Line and Space, llc
Kevin Stewart, Line and Space, llc

Summary of visit

- Conditions on hill below the cistern at Oliver Ranch: quarter moon, light pollution over Blue Diamond Hill to the East and Northeast (Luxor beam visible), lights of Bonnie Springs easily visible with additional lights at Parrot house, visible/audible cars on Highway 159, up to 6 planes visible at any one time with a new plane arriving every minute or so ('east-west flight path' seems to be a few miles south of the site), very cool downslope breeze
- Conditions on Highway 159 at entrance to the Visitor Center: light pollution over Blue Diamond Hill to the East and Northeast (Luxor beam visible) with some lights from town visible, lights of Visitor Center visible, planes visible (same as at Oliver Ranch).
- An interesting idea (to be discussed) would be to move the Observatory into the canyons (old house foundation near Willow Springs?) and be more connected to the 'place' with an actual arrival/departure experience. Bus/shuttle from the Visitor Center (would control # of people arriving, groups of ± 45). Be careful not to infringe upon site angles with actual location in canyon (closer to base than in a slot at the end of the canyon).

Wednesday, May 26th

10:00am – 11:35am

Meeting at Oliver Ranch with Kenny Anderson (*see separate meeting minutes*)

1:55pm – 2:40pm

Blue Diamond Elementary School visit

Attendees

David Hall?, CCSD
Laura Flynn, CCSD
Michael Reiland, BLM
Les Wallach, Line and Space, llc
Bob Clements, Line and Space, llc
Kevin Stewart, Line and Space, llc
3rd thru 6th graders at Blue Diamond School

Summary of visit

- Prior to our visit the students had divided into teams and designed/developed their ideas for the Oliver Ranch School.
- Line and Space introduced ourselves and then began to discuss the possibilities of the school with the students.

Trip Summary

Red Rock Canyon National Conservation Area

- It was immediately apparent that the students were excited about the school and the possibility of spending some time learning in the environment. The amount and quality of ideas (summarized below) that were generated in the discussion was invaluable.
 - Larger sleeping rooms serving 6-8 students are much more desirable than rooms serving 4-6 students.
 - Top bunks were the preferred sleeping arrangement (25% of them wanted to sleep on the bottom bunk) until hammocks were mentioned and unanimously agreed upon as the best sleeping idea.
 - The following are desirable design elements: large windows to capture views of the mountains, wildlife (including insects), and stars; porches or rooftop viewing areas with telescopes and spotting scopes (with night vision); nooks with beanbags for socializing; desks with computer for working/researching; indoor/outdoor flexibility using large operable walls with windows; buildings that imitated animal adaptations to the desert, i.e. burrowing (although some concerns about the structural integrity of the building were raised).
- During our discussion of water conservation it became apparent that the student were very 'water aware,' and developed many excellent ideas for water conservation/re-use at the school: use A/C condensate for irrigation, provide basins in the showers to collect the water for use as irrigation, provide limits on water usage with provision of water time (3 minute coins) to be used by the students.
- The students saw the internet as a possible way to broaden the audience of the school through pen-pals, fielding questions from other schools, and developing an online journal.
- The students agreed that hikes of 2-3 miles are not difficult as long as an adult with a first-aid kit accompanies them and they have plenty of water.
- The students then presented the (3) designs of the Oliver Ranch School, the designs are available.

7:00pm – 9:35pm

Blue Diamond meeting (*see separate meeting minutes*)

Thursday, May 27th

5:20am – 8:00am

Walking tour of the Oliver Ranch

Attendees

Les Wallach, Line and Space, llc
Bob Clements, Line and Space, llc
Kevin Stewart, Line and Space, llc

Summary

- Walked the perimeter of the site and spent some time identifying an alternative location for the WHB facility.
- Identified some groups of mesquite trees near the alternative location for the WHB facility for outdoor gathering of students.
- 'Discovered,' but was unable to identify, a grass growing on the Parrot property adjacent to Oliver Ranch. Perhaps the grass could be used at the WHB pasture??
- Identified erosion areas along perimeter of site. One area at the southwest corner of the property could be subsidence.
- Identified a grouping of oaks on the west side of the property as a possible gathering space for students.

Trip Summary

Red Rock Canyon National Conservation Area

8:00am – 10:00am

Tour of Blue Diamond Hill with Richard Leifried (*meet in front of gate accessing Oliver Ranch)

Attendees

Les Wallach, Line and Space, Ilc
Bob Clements, Line and Space, Ilc
Kevin Stewart, Line and Space, Ilc
Richard Leifried, Master Gardener
Paul Buck, DRI
Ramona Sakiestewa, cultural consultant
Andy Merrel, cultural consultant
Lola Henio, BLM – Interpretive Specialist
John McCarty, OTAK
The graduating class of master gardeners

Summary of tour

- The aforementioned participants toured Blue Diamond Hill stopping (5) times to identify separate plant species (Blue Diamond Cholla, Mojave Yucca, multiple species of Barrel cactus, etc.), fossils, and talk to Bill Rogers of BP Gypsum.
- The Line and Space team along with Ramona Sakiestewa and Andy Merrell left the tour at approximately 10:30am.
- Les explained to Richard Leifried that: the proposed greenhouse should be designed specifically for Oliver Ranch and the desert because a standard, off-the-shelf greenhouse is problematic in the desert (due to issues with overheating). Les proposed that Line and Space could talk with the donors about getting a 'kit-of-parts.'
- Richard mentioned that the Oliver Ranch School may be able to get 'gear' from Sports Authority (Richard's past employer).

1:00pm – 2:15pm

Review student designs at Hancock Elementary School

Attendees

Gary Flood, CCSD
Laura Flynn, CCSD
Michael Reiland, BLM
Les Wallach, Line and Space, Ilc
Bob Clements, Line and Space, Ilc
Kevin Stewart, Line and Space, Ilc
5th graders of Hancock Elementary

Summary of visit

- Subsequent to the original visit by Line and Space, the students had formed teams and developed ±20 designs for the 'sleeping areas' of the Oliver Ranch School.
- After introducing ourselves, Line and Space toured the room talking to each team about their specific designs which included the following elements: rooftop telescopes, multi-level spaces with separations for sleeping/working/socializing, large windows, themed rooms, and variations upon traditional sleeping arrangements (sleeping shelves, hanging beds, star-shaped bed, etc.).
- Line and Space selected (2) winning projects and presented them with their awards.
- Les Wallach then gave a power-point presentation of the Line and Space's work.
- Photo documentation of the student projects is available.

3:30pm – 5:30pm

Wild Horse and Burro meeting (*see separate meeting minutes*)

Meeting Minutes

Oliver Ranch School

Subject: Cultural history of Native Americans on the Oliver Ranch site
Location: Oliver Ranch
Date: May 26, 2004
Time: 10:00am

Attendees

Kenny Anderson, cultural resource person for the Las Vegas Paiute Tribe
Lola Henio, BLM – Interpretive Specialist
Kathy August, BLM
Linda Nations, RRCIA
Ramona Sakiestewa, cultural consultant
Andy Merrel, cultural consultant
John McCarty, OTAK
Les Wallach, Line and Space, llc
Bob Clements, Line and Space, llc
Kevin Stewart, Line and Space, llc

Summary of the Projects with emphasis on Oliver Ranch School

Presenter: Les Wallach

- A new Visitor Center will be built with administration moving into a remodel of the existing Visitor Center.
- The Oliver Ranch School will be a 'sleep-over' school (3-4 nights) for ± 100 kids. The school will focus on science, but will also include artistic expression (writing, painting, etc.).
- In support of this mission there will be facilities to accommodate ± 130 people (including the kids) living on the site.
- It is the intent of the school to facilitate the kids taking personal responsibility for the land, i.e. stewardship.
- The Wild Horse and Burro Facility which currently uses a portion of the site for the school, will be relocated to a different part of the Oliver Ranch site. A large component of the program at the Wild Horse and Burro facility will be education of the kids from the Oliver Ranch School.

Discussion of the Native People's history on this site and resources currently available

Discussion with Kenny Anderson

- Les Wallach informed Kenny Anderson that in order to supplement the traditional science and artistic curriculum, project participants feel it is important to introduce the children to an alternative view of the land and the night-sky, that of the Native Americans. Therefore, it is important to get the Southern Paiute perspective on this area. If we are able to introduce how the Native Americans think then we can hopefully increase the kids knowledge base and the kids acceptance of the Native American culture (including other cultures in the future).
- Kenny Anderson advised that: 26 different sovereign Native American Nations exist in Southern Nevada; it is possible that all of the native peoples of southern Nevada used the site, including but not limited to: Paiute, Moapee, Shoshonee, Southern Paiute, San Juan Paiute, etc.; the tribes of Southern Nevada have similar languages, customs, and stories (creation); the relationships between these different groups were developed and strengthened by their interactions with the river; inter-tribal marriages, trading of goods (and songs: the Hualapai sing Paiute songs), and their interaction has resulted in a general mixing of all of the tribes.

Meeting Minutes

Oliver Ranch School

- Kenny Anderson presented the idea that the children could be taught about tracking the night-sky to determine the appropriate times to harvest certain plants. He will look into additional ideas for relating the ways of the Native Americans to the students.
- Kenny Anderson told that: Paiute = True Water, but the Paiutes also refer to themselves as Nuwuvi = The People. Ankaharem?=red; Toom?=rock; Charles Carroll has the actual 'Red Rock' translation.
- Les Wallach told those participating that: it is important to know what cultural sites are at Oliver Ranch for three main reasons: (1) prevent their destruction, (2) preserve, study, and introduce the students to them, and (3) reference what is learned at Oliver Ranch to other sites. Kenny Anderson advised that Kathleen Sprow, USFS, surveyed the Spring Mountain Area as to sites important to the Native peoples. It was decided that if any of these sites are visible from the cistern (or other location on the Oliver Ranch site) they could be shown to the students. Linda Nations has identified a 'mano' at Mormon Green Springs 1, and a grinding site near Mormon Green Springs 2.
- Kenny Anderson (in conjunction with Linda Nations) then informed participants of the following: The Northern Moapa Paiutes have many people (± 300) and therefore many resources in regards to their culture and history; the Southern Paiutes, however, have few people (± 50 with 7 tribal elders) and little resources. Some of the written resources available are: The Rocks Begin to Speak (interpreting petroglyphs), Las Vegas Paiutes (history book available at the tribal office), and Nuwuvi (video or book??). Other written resources available which Kenny Anderson approved of are the works of Lavan Martineau (specifically The Southern Paiutes), Richard W. Stoffle (of the Yucca Mountain Project), Isabelle Kelly, Kathleen Fowler (may have information specific to Oliver Ranch), etc. (see the bibliography compiled by Ramona). Oral histories (collected by Liz Warren??) as well as unpublished information on Las Vegas Paiutes and Southern Nevada Paiutes are available in the Special Collections @ UNLV (Peter Michelle, Head Librarian). Southern Nevada Paiute living history demonstrators for the Southern Nevada Tribes are rare, but Everitt Pickavit is a Moapa master basketweaver that teaches classes. Refer to the Yucca Mountain Center Native Uses of Land?? for a list of 17-23(?) Southern Nevada tribes and other resources.
- Kenny Anderson will meet with the Southern Paiutes to see if they will talk to Ramona. Tribal members have been 'burned' in the past by providing their knowledge to others who then profited while offering nothing back to the Southern Paiutes. Also, they see the process of providing this information to outsiders as a double-edged sword: they are a private people that do not feel comfortable providing information about their culture to outsiders, however, the written record becomes a valuable history of the tribe that can be passed onto younger generations. Specific Southern Paiutes that Kenny Anderson mentioned contacting are: Clarabelle Jim, Richard Arnold (tribal representative to Nellis AFB?), Roger Ben (relative of 'Whispering Ben'?), and others. Ramona Sakiestewa will then set-up a meeting at the Tribal Office and possibly interview individual tribal members (for which Line and Space may need to pay a per-diem).
- It would be interesting to discover the Native American Southern Paiute relationship with horses. Kenny's grandfathers and uncles always had horses from the range when he was growing up; but as they ended up moving into town, they had to turn them loose. Kenny will investigate how the horses were gentled.

Meeting concluded at 11:35am

Notes by: Kevin Stewart – Line and Space, Ilc

**Southern Nevada Public Lands Management Act
Capital Improvement Nomination
Round 4**

**OLIVER RANCH SCIENCE SCHOOL COMPLEX
AND WILD HORSE AND BURRO FACILITY**

1. General Description of the Project

Oliver Ranch is a 300-acre parcel acquired by the Bureau of Land Management (BLM) in 1993 and incorporated into the Red Rock Canyon National Conservation Area (RRCNCA). The BLM's proposed General Management Plan (Dec., 2000) for the RRCNCA states that the development of an environmental education center is a primary consideration for this site. A feasibility study (included) has been completed and detailed analysis supports the suitability of Oliver Ranch for such an environmental education role.



Oliver Ranch

Desert regions are a major world ecosystem covering approximately 20% of the Earth's land area. The Mojave Desert, the primary educational and scientific focus of this project, covers approximately 30,000 square miles, roughly the size of Maine. The RRCNCA is one of the most beautiful and unique areas in this remarkable arid environment. The expanse of the Mojave Desert and the RRCNCA contain an extensive variety of habitats, species, and land forms, all of which enhance the suitability of this site for the study and experience of desert ecosystems.

The Oliver Ranch project would result in the creation of the Oliver Ranch Science School (ORSS) complex, which would include a residential science school, a field research station, an astronomical observatory, and a Wild Horse and Burro (WHB) facility. The ORSS complex would incorporate state-of-the-art sustainable design concepts that are appropriate for an arid land environment. "Green" architectural and engineering features are to be used to the maximum possible extent in construction of the facilities. Specifically, the use of solar and wind power, an advanced wastewater treatment plant, and the utilization of environmentally friendly building materials will ensure that the buildings themselves reflect environmental responsibility. Educational materials, displays, and programming on these sustainable design features will integrate the concept of environmentally responsible building into the learning experience for visitors to the complex. In addition, every effort will be made to utilize the previously disturbed areas of the ranch site and retain or preserve some of the existing ranch structures.

The major building components of the Oliver Ranch Science School complex will include:

- Administration and Staff Offices
- Residential Living Facilities:
 - A maximum of 250 beds
 - Dining and kitchen areas
 - Restroom facilities, including showers
 - Laundry outbuildings
- Classroom and Research Facilities, including:
 - Conference Rooms
 - Laboratories
 - Astronomical Observatory
 - Environmental Monitoring and Weather Field Stations
- Waste Water Treatment Plant
- Equipment Storage Outbuildings
- Electrical, Mechanical and Maintenance Shop
- Parking Areas

In conjunction with funding for the ORSS, funding is requested for the new WHB facility, which will be part of the ORSS complex. The new WHB facility will replace and greatly improve upon the existing corrals at Oliver Ranch. The new WHB site is approximately .5 miles from Oliver Ranch. Although the major anticipated missions of the WHB facility will be distinct from those of the proposed ORSS complex, there will be crossover with the school's curriculum, and an educational component will be an integral part of the new WHB program.



Feral Burro near Oliver Ranch

The primary elements of the WHB facility-building program include:

- Resident Horse Barn - Accommodating six horses, with a tack room
- Holding Corral
- Animal Infirmary - For 4 horses, with a bunk room
- Pasture - Fenced, flexible usage, approximately 2 acres
- Hay Storage - Approximately 3 months storage for 25 horses
- Helipad - with 90-foot diameter "safety circle"
- Amphitheater/Arena - For special riding events, but flexible for use in other types of demonstrations, adoptions, classes and shows, seating for 100
- Office - With 4 to 5 work spaces and small conference space
- RV Site with Utilities - For seasonal use by a single resident
- Equipment Garage - For one ATV with trailer and one tractor
- Outdoor Gathering Space - For barbecues and similar social events
- Parking - For staff, public, trucks, equipment and special events

2. The Approximate Cost of the Project: \$22,405,998

Oliver Ranch Science School Complex -- Preliminary Adjusted Budget Summary (See Appendix A for original budget details.)

Component	Cost	Total
PROGRAM AREAS		
Entry and Admission	438,000	
Fitting and Laundry	264,000	
Residential	4,028,625	
Dining and Kitchen	1,155,000	
Classrooms and Laboratories	1,534,000	
Observatory	800,000	
Wild Horse and Burro Program (distinct from WHB facility)	76,000	
Electrical and Maintenance	232,000	
Waste Water Treatment	160,000	
General On-Site	3,375,500	
General Off-Site	475,000	
PROGRAM SUBTOTAL		12,538,125
ADDITIONAL COSTS		
Contractors Fees	1,940,718	
Other Fees and Project Costs	1,286,523	
Equipment and Interiors	864,000	
BUILDING SUBTOTAL		4,091,241
Project Contingency – 10% of costs	1,662,937	1,662,937

Total Costs

\$ 18,292,303

(Note: Not included are land costs, construction interest, and owner's insurance)

Wild Horse and Burro Facility Preliminary Budget Summary (See Appendix A for details.)

Resident Horse Barn	155,000	
Amphitheater and Arena	575,000	
Office	175,000	
Holding Pens/Chutes	78,000	
Corral	115,000	
Animal Infirmary	617,000	
Pasture	60,000	
Miscellaneous Facilities	133,000	
General On-Site	895,000	
General Off-Site	202,000	
FACILITY SUBTOTAL		3,005,000
Project Contingency – 10% of costs	300,500	
Fees	808,195	

Total Costs

\$4,113,695

(Note: not included are land costs, construction interest, and owner's insurance)

3. Operation and Maintenance Requirements

Cooperative Agreements will be developed between the BLM and the contractors selected to directly operate and maintain the ORSS complex, including the WHB facility. It is likely that more than one contractor will be required to operate the various facilities within the ORSS complex – one contractor would operate the ORSS and another would operate the WHB facility. The Cooperative Agreements will describe in detail the responsibilities and roles of each party entering into the agreement. The Cooperative Agreement will be the vehicle for establishing accounts for utilities, maintenance, insurance, and indemnity and other prescriptive requirements that may be specified by the BLM. The operating entities will be experienced, competent, non-profit, education-focused organizations.

The operating entity for the proposed ORSS can expect a revenue stream derived from fee-based programs, scholarship support, fundraising activities, and in-kind donations. Additional revenue will be provided by grants available from both private philanthropic foundations and various governmental agencies. Preliminary *pro forma* budget projections yield operating surpluses after the second year of operation. Other revenue streams are expected from supplemental programming in connection with community field seminars, astronomy programs, special events, conferences and retreats, and a retail gift store.

At this time, an operating organization has not yet signed a Cooperative Agreement. The Outside Las Vegas Foundation (OLVF) has been acting as a facilitating entity, coordinating the Oliver Ranch feasibility study, conducting initial fundraising efforts, and supporting federal land management partnerships. The OLVF (as the primary interagency, private/non-profit partner to the four federal land management agencies) will continue its commitment to this project and is confident in its ability to attract the necessary community support for the long-term success of the ORSS.

Monies to operate the WHB facility will derive from the BLM through the National Wild Horse and Burro Program. Private fundraising and in-kind contributions from non-profit support organizations and from governmental and private grants will supplement these monies.

4. Nomination Assessment

*4-1. Does this project improve safety for visitors and/or employees? **Yes.***

It is anticipated that the proposed ORSS will have long-term positive impacts on safety. Components of the proposed ORSS curriculum will focus on how to appreciate the desert in an appropriate and safe manner. Students of the ORSS and visitors shall be either existing or potential users of the public lands, thus safety education will result in more responsible use by this group. Furthermore, friends, relatives, and parents of the students and visitors could potentially be influenced by what individual students have learned.

Robust on-the-job safety measures for faculty and staff of the proposed ORSS complex will be defined and rigorously encouraged. In addition, all hikes, destinations, activities,

equipment and facilities will be constantly monitored to ensure that faculty, staff and student safety remains a priority.

4-2. Does this project provide more or improved visitor facilities to meet increasing demands, and changing demographics? Yes.

The proposed ORSS complex will be the only residential, environmental education and research center in a managed National Conservation Area. It is anticipated that the studies conducted and educational opportunities provided at the proposed ORSS complex will strongly influence the understanding of fragile desert ecosystems. The facilities constructed with this funding request will have a multi-purpose function. In conjunction with its mission-related environmental education uses, the proposed ORSS complex has additional applications including serving to host conferences and special programs and offers an alternative site for some activities currently being offered at the Visitor Center. Examples of additional applications include:

- With the completion of the ORSS Observatory, the astronomy programs currently offered at the RRCNCA Visitor Center would have the option to expand in scope and participation. The current RRCNCA astronomy programs are increasing in popularity even though facilities are very limited, suggesting that a market exists for expanded programming of this nature.
- Clark County has a large and growing senior and retired population. The future ORSS complex is a viable host for Elderhostel programs.
- The proposed ORSS Greenhouse will allow Master Gardeners to both expose visitors to native plant restoration projects and conduct special community classes on native plant horticulture.

4-3. Does this project provide more/improved educational opportunities? Yes.

Environmental Education as a Priority

Environmental Education is one of the highest priority focus areas identified by the Outside Las Vegas Federal Partnership, which consists of the Bureau of Land Management (BLM), National Park Service, U.S. Forest Service and U.S. Fish and Wildlife Service. Ranging from the lush forested alpine environment to the nation's largest man-made lake to desert landscapes – seven million acres of public lands in Southern Nevada converge to form a unique setting for a large North American urban area. Included in these spectacular landscapes are eight Congressionally designated areas managed by the four federal land managing agencies plus three million acres of BLM public land. These lands and waters contain one of the most diverse arrays of plants and animals on the planet with over 1,000 species of plants, 400 species of birds, 142 species of mammals, 54 species of reptiles and 41 species of fish. There is also an impressive array of both historic and prehistoric sites of national significance. This exceptional assemblage so close to where 1.6 million people reside offers an unparalleled potential for environment-based education programs to improve and directly influence student learning. Environmental education, *in situ*, is an ideal integrating context for learning

about not only the ecological issues faced locally within the Mojave Desert, but also about those challenging the United States as a whole.

The need for environmental education is particularly acute in Southern Nevada. The Las Vegas metropolitan area has been the fastest growing urban area in the country for the past decade, with a resident population now exceeding 1.6 million and tourist visitation at over 36 million per year. There are approximately 5,000 new residents moving to Las Vegas every month. Over 900,000 new residents have moved to the area since 1990. Unfortunately, many of Las Vegas' residents do not appear to have an understanding of the natural environment that surrounds their city nor a sense of responsibility for its condition. The pressures of the population explosion, increasing visitor volume, and urban interface and encroachment are creating tremendous management challenges for the federal land management agencies. These challenges take the form of increased desert dumping, litter, graffiti, and illegal uses of the federal lands, which affect sensitive species and their habitats. Much of these abuses to the public lands stem from ignorance rather than malicious intent. The most powerful tool for sustaining our public land areas and combating these abuses is through involvement and education.

To help facilitate environmental education initiatives, the Outside Las Vegas Federal Partnership asked the Outside Las Vegas Foundation (OLVF), its primary interagency non-profit partner, to establish a broad-based Environmental Education Committee. One of the roles of this Committee, which consists of 19 partner organizations, is to develop a comprehensive strategy for environmental education across the seven million acres of federal land. Although the planning process is still underway, the Committee strongly supports the concept of a residential environmental science field school at Oliver Ranch. They believe the ORSS will serve as an integral component within a comprehensive program for Southern Nevada. Likewise, the Outside Las Vegas Federal partners support the ORSS. Although the proposed ORSS complex is located on BLM land within the Red Rock Canyon National Conservation Area, the Federal partners foresee the contribution of the ORSS to a long-range comprehensive program that benefits all public lands.

In addition, one of the goals of the "Partnership for Excellence in Mathematics, Science, Engineering and Technology Education" is to capitalize on the community's unique surroundings and build capacity to support both formal and informal learning by K-16 educators and students on the public lands. The purpose of this Partnership is to strengthen mathematics science and technology education for all students in Southern Nevada. The Partnership includes: Clark, Esmeralda, Lincoln, and Nye County School Districts; Nevada Department of Education; University of Nevada Las Vegas; Desert Research Institute; KLVX (a PBS affiliate); Community College of Southern Nevada; and the Outside Las Vegas Foundation. The Partnership recognizes the value of on-site field ecology education in supporting classroom efforts and believes that integrated field-based education is realistic and will be a successful part of the solution to better student and teacher performance.

The positive results achieved across the country in efforts to utilize the environment as an integrating context for learning such as is proposed at the ORSS are documented in a report entitled "Closing the Achievement Gap-Using the Environment as an Integrating

Context for Learning” by Gerald A. Lieberman and Linda L. Hoody (1998; State Education and Environment Roundtable). In their study, Lieberman and Hoody suggest use of the environment not only improved performance on standardized measures of academic achievement, but also reduced discipline and classroom management problems and increased student engagement. Furthermore, the Yosemite National Institutes, which operates three science field schools that are similar to the proposed ORSS, contracted a 1999 Stanford University assessment of their operations; the Stanford analysis findings were analogous to those described within the Lieberman and Hoody report.

Oliver Ranch Science School

The proposed ORSS will fill an important niche, lacking in the educational programming currently offered in the Las Vegas community and on the surrounding public lands. There is no residential field school in Southern Nevada and very few study centers for arid lands exist in the United States. Preliminary market analysis (see attached feasibility study for details) recommends that programs of three days in length be offered to target groups. By the fifth year of operation, approximately 14,400 students per year could be accommodated including about 11,500 10 to 13 year olds. In the year 2005 there will be over 87,000 students in this age group in Clark County alone and over 125,000 such students statewide. The potential market far exceeds the school’s projected capacity. It is anticipated that the ORSS field science school programs would be conducted 36 weeks each year. In addition to usage for core programs, it is envisioned that the ORSS complex will be used for teacher training, community field seminars, Elderhostel, and inter-generational programs, nighttime astronomy programs, wild horse and burro education programs, special events, conferences, and retreats.

The ORSS will teach participants about the natural world through inquiry-based experiential and interdisciplinary methods. The intent is for the participants to gain an appreciation of desert ecosystems and to begin to apply their knowledge of ecological interconnection to world ecological systems. The hands-on science instruction will be conducted in an advocacy-free environment. Students will be encouraged to develop their own conclusions about how environmental stewardship fosters the continued existence of the natural world and the sustainability of resource use.

The residential component and on-site laboratory and classroom facilities of the ORSS will provide educators with the necessary time and organization to maximize the exploration of topics. At the ORSS complex students will be able, in one setting, to make ecological observations, discuss hypotheses, observe and participate in data collection, perform analyses to generate results, and discuss conclusions (i.e., utilize the scientific method). Within the confines of the day programs currently conducted on public lands with packed-in or no scientific gear, the curriculum available is clearly limited and less robust than what is possible at the proposed ORSS. In addition to gaining ecological and environmental knowledge and that of the associated research practices and technologies, students will concurrently be engaged and challenged in the areas of leadership, communication skills, and problems solving, as well as community and diversity. The subject matter taught at the proposed ORSS will be correlated to the Clark County School

District curriculum and standards, helping educators to continue science education in their own classrooms.

The Desert Research Institute (DRI), part of the University and Community College System of Southern Nevada, proposes to conduct applied environmental research (e.g., spring restoration and ecology; weather and climate; long-term air quality and visibility; and dry lands ecology restoration) at and around the proposed ORSS. DRI has a national and international reputation for basic and applied research, and its research scientists can make expert contributions to curriculum development at the ORSS. Socially relevant environmental research is important for students and teachers. Students of all age groups and K-12 teachers will be able to participate in actual research and then study the results in their own classrooms. In addition, interactive learning programs can be developed to share information and experiences with students from across the United States. Scientific collaboration with other arid-land study centers could eventually be implemented, both nationally and internationally.

The ORSS will include various instrument packages that will allow for real-time monitoring and display of collected data. For convenience and continuity, large-scale data collection will be automated, but most measures could easily be taken manually by students to demonstrate technology and provide immediate data for classroom discussion. The field science school programs coupled with applied environmental research will provide powerful learning tools for students and teachers alike.

The Oliver Ranch Science School Observatory

The proposed ORSS Observatory will offer significant opportunities for astronomy education through tours, multimedia programming, and other educational activities and events. The facility will include both a primary telescope and adjacent pads to support portable telescopes. The control room will have computer support for the primary telescope as well as broadband Internet access to control telescopes at remote sites. The proposed ORSS Observatory primary facility is designed to accommodate groups of around 30 students per session. And, it is anticipated that the ORSS Observatory will provide access to its primary telescope via the Internet, and thus will be accessible to students and teachers around the world.

This facility will be integrated into the ORSS school programs and will be available for special evening and weekend programming. Visiting the observatory will provide a vigorous educational experience that will encourage the study of astronomy and will increase understanding of the universe. The proposed ORSS Observatory will also include Internet-based outreach programs (e.g., electronic newsletters) as well as web-based virtual tours and activities. The proposed facility will be well suited to interface with other national and international astronomy education programs.

The Wild Horse and Burro Facility

The WHB facility offers an exceptional opportunity to educate the public about the National Wild Horse and Burro Program and the challenges of maintaining these animals in ecological balance. The proposed WHB facility will be the only such facility in the country, and it is anticipated that education will be a principal role of the facility. Wild horses and burros are naturalized species common within the Red Rock Canyon National Conservation Area. The Oliver Ranch site is currently an active Herd Management Area with horses and burros living in the immediate vicinity. The adoption program, which places tamed or gentled animals into private ownership is not well known in the area. The ORSS students and visitors will be exposed to three levels of learning opportunities related to the National Wild Horse and Burro Program. First, participants will have the opportunity to observe and learn about the gentled animals within the corrals. Second, these animals are likely to be encountered in the field either by actual sightings or indirectly through tracks or scat on trails, providing further opportunity for discussion. Thirdly, the WHB facility will be a destination for groups to observe the gentling process and adoption program.

The ‘Built Environment’

The entire ORSS complex will be designed as a green facility, which incorporates sustainable features in the design and operation (see 4-4, below and Appendix B for details). As such, the built environment will also be used as part of the learning experience.

*4-4. Does this project protect the integrity of significant resources values or improve the quality of the environment? **Yes.***

The issue of Carrying Capacity will be vigorously addressed through management plans to mitigate unwanted impacts. According to the General Management Plan, the RRCNCA hosts the two federally - listed threatened and endangered species, and 43 other species of concern. The presence of these species will require careful management to avoid student impact, but the fact that the RRCNCA contains such important species provides powerful learning opportunities for students.

Opportunities for stewardship involvement will be made available. A potential exists for collaboration with the University of Nevada Cooperative Extension to build and operate a greenhouse on the Oliver Ranch site. It is anticipated that native plant propagation and restoration projects will be part of the curriculum. Additional stewardship activities could include trail building, litter and graffiti removal, and the removal of invasive non-native plants.

The ORSS will present unique opportunities for students to become involved in long-term biomonitoring and other research projects. To learn about fundamental ecological issues under study at the field station, experimental results, and more importantly, real time discussions based upon the results, method of study, and the significance of the studies can

be shared with students throughout the community, state, and country through interactive learning processes.

Oliver Ranch ORSS also has the potential of becoming a regional training center for Federal Leave No Trace (LNT) programs. LNT techniques designed specifically for arid lands would help alleviate land manager concerns about impacts on the desert ecosystem. This training strengthens the stewardship message for both students and teachers.

It is important to note that the buildings of the proposed ORSS complex will reflect the mission of this facility in teaching environmental responsibility by both utilizing sustainable design features and incorporating the building design into a tangible learning experience. The proposed school complex will promote a 'sense of place' that is unique to both the immediate Oliver Ranch site and to the regional desert landscape. Architectural learning opportunities at the ORSS range from appropriate building placement in relation to the sun to sophisticated wastewater treatment technologies. The *LEED Green Building Rating System*[™] (the industry standard for rating buildings in terms of energy and environmental performance) and the *Energy Design Guidelines for High Performance Schools in Hot and Dry Climates* guided the proposed concepts for development (see Appendix B for details). Furthermore, careful design measures will ensure that the visual aesthetics of the site will be preserved. When implementing these concepts, a concerted effort will be made to make them part of the learning experience (i.e., to teach how the built environment can be environmentally responsible).

4-5. Does this project improve the efficiency and effectiveness of natural resource management activities? Yes.

Oliver Ranch Complex

The Oliver Ranch Complex improves the efficiency and effectiveness of the natural resource management activities in several ways. Primarily, it is anticipated that the complex will become a nationally, and perhaps internationally, significant environmental and science educational venue as well as an important field research facility. Education is critical to developing and maintaining the public's support for natural resource management programs. On local terms, over 900,000 people have moved into the Las Vegas community since 1990. Many of these new residents appear to have very little understanding and appreciation of our desert systems. Impacts and disturbances to these natural systems likely result from a lack of understanding and appreciation of our natural resources. By providing a broad range of educational activities, we intend to build community awareness and support for the natural resource management programs already in place. It follows that this awareness and support, in turn, will reduce impacts to the public lands.

Wild Horse and Burro (WHB) Facility

The Wild Horse and Burro (WHB) Facility component will directly enhance the efficiency and effectiveness of natural resource management activities in that it assembles, in one location, all of the operational elements of the WHB Program. The existing corrals at Oliver Ranch are used as a temporary holding site for wild horses and

burros collected from gathers and for occasional adoptions. This inefficient facility must be replaced in order to meet the operational needs of the WHB Program. Oliver Ranch is situated within the Red Rock Herd Management Area, a site that contains both wild horses and burros. The WHB Facility will be a permanent holding and processing site. The proximity of the proposed facility to nearby Head Management Areas will allow for minimal transportation, processing, and adoption cost. Regular pre-and post-adoption clinics will be held at the facility to prepare new owners for the responsibilities inherent in the adoption of a wild horse or burro, and help foster long successful relationship between new owners and their adopted animals. The facility will also relieve the overcrowding of other long-term holding facilities and increase the number of potential adoptions in Southern Nevada. In addition, a potential exists to reach untapped markets for adoptions due to the high-profile nature of the proposed Oliver Ranch Complex and its associated programs. Such exposure would be beneficial to the BLM and the National Wild Horse and Burro Program.

The infirmary component of the WHB facility will allow for the treatment and care for injured adult horses and orphaned infant wild horses and burros on site. A holding area within the facility will reduce the stress of long-distance hauling currently required of Las Vegas area wild horses and burros in transport to the Ridgecrest, Kingman and Palomino Valley Center holding facilities. The location of the Oliver Ranch WHB Facility will expedite animal care and reduce casualty potential during periods when extreme conditions exist. The WHB Facility and associated programs, once in place, will be the only such facility of this kind in the country. This facility will offer unique environmental education opportunities in the area of maintaining an ecological balance between wild horses and burros and their environment.

Also, the research laboratory component of the Environmental Education Field School presents another outstanding opportunity for integrating environmental education and research. Combining quality environmental education with “real world” research projects can help promote increased understanding and stewardship of public lands. The Desert Research Institute proposes to conduct applied environmental research at and around the proposed Oliver Ranch Environmental Education School. This research will be utilized in the development of environmental science education curriculum at the proposed ORSS and will be conducted in close collaboration with agency educators and program managers.

*4-6. Does this project involve significant funding partnerships is land acquisition, development or management? **Yes.***

The project has assembled critical partners (below) who will contribute to funding the facility and the programming.

Outside Las Vegas Foundation

The Outside Las Vegas Foundation has agreed to:

- 1.) Facilitate fundraising to support those elements of the complex that are not eligible for Southern Nevada Public Lands Management Act Funds (e.g., computers and

- peripherals, consumable supplies, kitchen ware, laboratory ware and equipment, furniture, linens, tools, vehicles and all other accessories necessary for the successful operation of a high caliber facility);
- 2.) Secure monies for an endowment to help cover operation and maintenance costs;
 - 3.) Secure scholarship monies needed to assure that the facility serves the needs of the entire community.

Red Rock Canyon Associations

The Red Rock Interpretive Association and the Friends of Red Rock Canyon have each pledged \$10,000 per year for scholarships once the facility is built.

Clark County School District

The Clark County School District is supports the proposed ORSS complex concept. Although they have not committed funding to this project, they indicate a possibility of financial support once the facility is built.

Equine Associations

The National Wild Horse Association, Nevada Commission for the Preservation of Wild Horses and the Wild Horse Foundation indicate a desire to assist in fundraising and programming.

Local Scientific Research Community

As noted in the response to Question 3-5 (above), The Desert Research Institute (DRI) plans to conduct applied environmental research in connection with the proposed ORSS. DRI has a national and international reputation for basic and applied research and its scientists can lend professional expertise to the proposed ORSS curricula. The DRI has committed to help raise funds for the various instrumentation packages allowing for the real time monitoring and display of collected data.

The Las Vegas Astronomical Society (LVAS), in cooperation with the planetarium at the Community College of Southern Nevada (CCSN) and the CCSN science faculty, have also offered their assistance. The LVAS will provide volunteer labor for programming. The Planetarium and faculty will provide technical support to insure the effective use of the astronomy facilities that are built.

The University of Nevada Las Vegas Marjorie Barrick Museum of Natural History and its research division, the Harry Reid Center for Environmental Studies, have offered full support and assistance to the project. The Marjorie Barrick Museum with its staff and collections will help support herpetological, ornithological, archaeological, and general ecology programs. The Harry Reid center will provide expertise in a variety of areas for programming and research support.

Federal Planning Organizations

The National Park Service's Denver Service Center and the Bureau of Land Management's Science and Technology Center have contributed planning and technical support to the ORSS complex project. Both organizations have pledged their continued support as planning continues. For example, they are investigating the possibility of

seeking grants from the Department of Energy (and others) for the alternative energy and “green” elements of the project.

*4-7. Does this project meet multi-agency goals or has multi-agency support? **Yes.***

The project meets both multi-agency goals and has multi-agency support. Environmental education is one of the high-priority focus areas for the Outside Las Vegas Federal Partnership. This was the result of a strategic planning process taken by the partnership in December 2001. The National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management and the U.S. Forest Service all support this project. These agencies will begin a collaborative effort to achieve their common goals of resource protection, environmental interpretation and education. The proposed ORSS will play a key role in accomplishing these goals by greatly expanding the opportunities for environmental education and by expanding the opportunity for partnership between the federal agencies and the private sector. The Oliver Ranch site was selected based upon established criteria by the four agencies. Of all sites considered, the Oliver Ranch site best met the criteria.

*4-8. Does this project have the support of state and local governmental and/or other interested parties? **Yes.***

Various environmental, educational and scientific organizations have expressed support for this project (see included letters of support). These organizations include the Clark County School District, Friends of Red Rock Canyon, Desert Research Institution, University of Nevada Cooperative Extension, Community College of Southern Nevada, National wild Horse Association and the Barrick Museum of Natural History

Faculty, staff and professionals from the above organizations have already donated their time and expertise to help complete the feasibility study. The Friends of Red Rock Canyon have also donated \$10,000 to help fund the study and have pledged an additional \$10,000 for environmental education scholarships for at risk students.

Appendix A
Preliminary ORSS Budgets – Calculated for 250 residents
(Appendix VI of the Oliver Ranch Feasibility Study)

PROGRAM COMPONENTS

ENTRY & ADMINISTRATION	CAPACITY	SQ. FT./PERSON	INT. SQ. FT.	EXT. SQ. FT.	\$/ SQ. FT.	COST	TOTAL
Entry, Gift Shop, Administration			1,900		\$150	\$285,000	
Teachers' Lounge - computer, phone, kitchenette	20	20	400		\$120	\$48,000	
Staff Prep Room - computer, phone, lockers, storage	20	40	750		\$120	\$90,000	
Infirmity	2		150		\$100	\$15,000	
Sub-Total:			3,200				\$438,000

FITTING & LAUNDRY	CAPACITY	SQ. FT./PERSON	INT. SQ. FT.	EXT. SQ. FT.	\$/ SQ. FT.	COST	TOTAL
Fitting Room - Desert Gear Outfitting			900		\$120	\$108,000	
Storage			500		\$120	\$60,000	
Laundry			300		\$120	\$36,000	
Miscellaneous			500		\$120	\$60,000	
Sub-Total:			2,200				\$264,000

RESIDENTIAL	CAPACITY	SQ. FT./PERSON	INT. SQ. FT.	EXT. SQ. FT.	\$/ SQ. FT.	COST	TOTAL
Staff Beds(On-Site)	3	465	1,395		\$125	\$174,375	
Guest Housing Beds	36	145	5,220		\$150	\$783,000	
Student Beds	204	105	21,420		\$125	\$2,677,500	
Chaperone Beds	30	105	3,150		\$125	\$393,750	
Sub-Total:	273		31,185				\$4,028,625
Program Notes: Typical School Group Sizes: 1 Chaperone/8 Students 66% - 12-40 Students 4-6, or 8 Beds/Student Room 23% - 41-80 " 2-4 Beds/ Chaperone Room 3% - 80-100 " Dorms Include: Entry, Lounge, Bathroom, Storage 8% - 101-240 " 40 Beds/Dorm - 4200 Sq. Ft. (Max. Size)							

DINING & KITCHEN	CAPACITY	SQ. FT./PERSON	INT. SQ. FT.	EXT. SQ. FT.	\$/ SQ. FT.	COST	TOTAL
Kitchen, Dining, & Recycling/Trash	150		7,200		\$150	\$1,080,000	
Loading & Trash/Recycling				3,000	\$25	\$75,000	
Sub-Total:	150		7,200	3,000			\$1,155,000

CLASSROOMS & LABS	CAPACITY	SQ. FT./PERSON	INT. SQ. FT.	EXT. SQ. FT.	\$/ SQ. FT.	COST	TOTAL
Large Multi-Use Classroom - Divisible into 2	140	15	2,100		\$150	\$315,000	
Desert Plants/Xeriscape Lab	15	30	450		\$200	\$90,000	
Desert Animals Lab	15	30	450		\$200	\$90,000	
Geology Lab	15	30	450		\$200	\$90,000	
Native Peoples Lab	15	30	450		\$200	\$90,000	
Wet Lab	15	30	450		\$250	\$112,500	
Hall of Environmental Heroes	65	15	975		\$200	\$195,000	
Library/Tech Room	65	15	975		\$150	\$146,250	
Art Room	65	15	975		\$150	\$146,250	
Greenhouse	15	8	120		\$75	\$9,000	
Weather Station				900)			
Air Quality Monitoring				200) ASSUME			
Water Monitoring				75) FOR		\$150,000	
Ground Water Testing				100) ALL			
Soil Testing				100)			
Sub-Total:	425		7,395	1,375			\$1,434,000

OBSERVATORY	CAPACITY	SQ. FT./PERSON	INT. SQ. FT.	EXT. SQ. FT.	\$/ SQ. FT.	COST	TOTAL
Main Telescope Room - 15 Ft. Dia. Dome			305				
Control Room			110				
Meeting Room			675				
Storage			110				
Outdoor Observing Pad - 8 Sunlens				1200)			
Sub-Total:			1,200	1,200			\$800,000

WILD HORSE & BURRO PROGRAM:	CAPACITY	SQ. FT./PERSON	INT. SQ. FT.	EXT. SQ. FT.	\$/ SQ. FT.	COST	TOTAL
On-Site Facilities							
Covered Stable, Feed, Tack, & Storage			800		\$50	\$40,000	
Round Pens, Trailer Access & Parking				7,200	\$5	\$36,000	
Students take or take ours to full facility at Borate Springs turn off							
Sub-Totals			800	7,200			\$76,000

ELECTRICAL & MAINTENANCE:	CAPACITY	SQ. FT./PERSON	INT. SQ. FT.	EXT. SQ. FT.	\$/ SQ. FT.	COST	TOTAL
Totler			50		\$100	\$5,000	
Control			100		\$100	\$10,000	
Office			120		\$100	\$12,000	
Maintenance			600		\$100	\$60,000	
Electrical			300		\$100	\$30,000	
Telephone/Data			150		\$100	\$15,000	
Storage			1,000		\$100	\$100,000	
Sub-Totals			2,320				\$232,000

Mechanical & Electrical Systems Notes:							
Battery Room - In each Building							
Water Storage - In each Building							
Hot Water Storage - In each Building							
A/C - In each Building							
Photovoltaic Cells - In each Building							
On-Site Generator - Fuel Cell (Kitchen)							
Wind - Well Water Pumping or Power Generation							

WASTE WATER TREATMENT:	CAPACITY	SQ. FT./PERSON	INT. SQ. FT.	EXT. SQ. FT.	\$/ SQ. FT.	COST	TOTAL
Pit, Tank, Pump, Storage Tanks			1,600		\$100	\$160,000	
Service Picking & Sump Area							
Leaching Field							
Sub-Totals			1,600				\$160,000

GENERAL ON-SITE:	CAPACITY	SQ. FT./PERSON	INT. SQ. FT.	EXT. SQ. FT.	\$/ SQ. FT.	COST	TOTAL
Covered Entry/Drop Off Area							
Loading/unloading Canopy - Covered W/ Mister	250	8		2,000	\$100	\$200,000	
Luggage Storage - Covered, Secure	250	5		1,250	\$100	\$125,000	
Vehicular Drop Off Loop				8,000			
Sub-Total				11,250		\$325,000	
On-Grade Parking							
Vans - Electric, Covered Area	7	400		2,800	\$5	\$14,000	
Staff	20	350		7,000	\$5	\$35,000	
Visitor							
Bicycle				300	\$5	\$1,500	
School Buses - Drop Off Loop Only							
Total Parking Spaces	27						
Sub-Total				10,100		\$50,500	
General							
Demolition & concrete wall repair in existing buildings					ASSUME	\$100,000	
Leach Field Removal					ASSUME	\$25,000	
Site work: underground utilities, grading, septic, lighting, irrigation, minimum landscaping, signage			10.5	acres at	\$200,000	\$2,100,000	
Septic Gray Water System					ASSUME	\$350,000	
Diesel Generator - Standard					ASSUME	\$125,000	
Kitchen Equipment					ASSUME	\$150,000	
Decks & Walkways - over drainage					ASSUME	\$50,000	
Rock Wall Allowance					ASSUME	\$50,000	
Amphitheater - Outdoor, Natural/Rustic, Stage, Firepit	250	12		3,000		\$50,000	
Water Stoc. Tank - Fire/Domestic - 10,000 Gal. - 15' Dia.				225		\$15,000	
Sub-Total						\$3,000,000	
Sub-Totals							\$3,175,500
Misc. Notes							
Fire Access - 14 - 18' Wide Road (Within 350' of all buildings)							
ADA - 5% maximum slope							
Need On-Site Maintenance Vehicle							

GENERAL OFF-SITE:	CAPACITY	SQ. FT./PERSON	INT. SQ. FT.	EXT. SQ. FT.	\$/ SQ. FT.	COST	TOTAL
Water - 8000 LF @ \$50/LF from Blue Diamond						\$400,000	
Hook-Up Fee - Amara District					ASSUME	\$50,000	
Electric - 300 LF @ underground from road					ASSUME	\$45,000	
Sub-Totals							\$475,000
Sub-Total Building - On-Site/ Off-Site							\$12,538,125

PROGRAM & BUDGET SUMMARY

PROGRAM AREAS	CAPACITY	INT. SQ. FT.	EXT. SQ. FT.	COST	TOTAL
Entry and Administration		3,450		\$438,000	
Fitting & Laundry		2,200		\$264,000	
Residential	273	31,185		\$4,028,625	
Dining & Kitchen	150	7,200	3,000	\$1,155,000	
Classroom & Lab	425	7,395	1,375	\$1,434,000	
Observatory		1,200	1,200	\$800,000	
Wild Horse & Burro		800	7,200	\$76,000	
Electrical and Maintenance		2,320		\$232,000	
Waste Water Treatment		1,600		\$160,000	
General On-Site				\$3,375,500	
General Off-Site				\$475,000	
Sub-Total Building - On-Site/ Off-Site		57,350	12,775		\$12,438,125
Note: All program areas include outdoor functions					

CONTRACTOR'S FEES				%	COST	TOTAL
Contractor's General Conditions				7.5%	\$932,859	
Contractor's Fees				7.5%	\$932,859	
Sub-Total					\$14,303,844	
Pre-Planning - EIR					\$50,000	
OTHER FEES & PROJECT COSTS						
Master Planning - programming spent to date					\$85,000	
Architectural & Engineering				8.0%	\$1,144,308	
Reimbursable Expenses - 5% of Fee					\$57,215	
Sub-Total						\$1,286,523
Sub-Total: Buiding, Site & Fees						\$15,640,367
EQUIPMENT & INTERIORS						
Vans - 7 x \$30,000				ASSUME	\$210,000	
Maintenance & Site Vehicles				ASSUME	\$150,000	
60,000 Sq. Ft. x \$12 psf					\$720,000	
Design fees - Inc. purchasing & Installation				20.0%	\$144,000	
Sub-Total						\$1,224,000
TOTAL : all costs, without contingency						\$16,864,367
Project Contingency - 10% of all costs				10.0%	\$1,686,437	
TOTAL PROJECT COSTS						\$18,550,803
Note: Not included are land costs, construction interest, owner's insurance						

Preliminary Budget and Program Wild Horse and Burro Facilities
(Appendix VI of Oliver Ranch Feasibility Study)

GENERAL OFF-SITE:	QUANTITY	UNITS	\$/ SQ. FT.	COST	TOTAL
Water - 6" Line	3,000	Linear Ft.	\$50	\$150,000	
Hook-Up Fee - Water District			ASSUME	\$15,000	
Electric underground from Bonnie Springs Road			ASSUME	\$10,000	
Path to Science School - 6' wide X 3000 Linear Ft.	18,000	Sq. Ft.	\$1.50	\$27,000	
Sub-Total:					\$202,000
GENERAL ON-SITE:	QUANTITY	UNITS	UNIT COST (\$)	COST	TOTAL
13.5 Acres					
Site Work - grading, utility distribution, lighting, paths, landscaping, irrigation, patios, newveys, & soils	10	Acres	\$50,000	\$500,000	
Water Storage - 10,000 Gallons			ASSUME	\$15,000	
Standby Diesel Generator			ASSUME	\$125,000	
Roads, Driveways, Ramps (Note - Extruded Engineered Mix)	60,000	Sq. Ft.	\$1.50	\$90,000	
Parking - 100 Cars & Trailers	35,000	Sq. Ft.	\$1.50	\$52,500	
Septic System	2	Systems	\$40,000.00	\$80,000	
Runoff Catch Basins			ASSUME	\$25,000	
Helipad - Conc. W/ Elec.	1,000	Sq. Ft.	\$7.50	\$7,500	
Sub-Total:					\$895,000
Sub-Total Building - On-Site/ Off-Site					\$1,097,000

FACILITIES

RESIDENT HORSE BARN:	QUANTITY	UNITS	UNIT COST (\$)	COST	TOTAL
Horse Barn / Tack Room	2,000	Sq. Ft.	\$75	\$150,000	
4" Sand Floor over 6" Gravel Base	2,000	Sq. Ft.	\$2.50	\$5,000	
Sub-Total:					\$155,000
AMPHITHEATER & ARENA	QUANTITY	UNITS	UNIT COST (\$)	COST	TOTAL
Fabric Roof	13,000	Sq. Ft.	\$35	\$455,000	
4" Sand Floor over 6" Gravel Base	13,000	Sq. Ft.	\$2.50	\$32,500	
Open Metal Fencing 7' High	500	Linear Ft.	\$50	\$25,000	
Permanent Seats	100	Seats	\$150	\$15,000	
Lighting	15,000	Sq. Ft.	\$2.50	\$37,500	
Entry/Control Area			ASSUME	\$10,000	
Sub-Total:					\$575,000

FACILITIES (CONTINUED)

OFFICE	QUANTITY	UNITS	UNIT COST (\$)	COST	TOTAL
Office w/ HVAC	1,000	Sq. Ft.	\$150	\$150,000	
Office Equipment & Furniture	1,000	Sq. Ft.	\$25	\$25,000	
Sub-Total:					\$175,000
HOLDING PENS/CHUTES	QUANTITY	UNITS	UNIT COST (\$)	COST	TOTAL
4" Sand Floor over 6" Gravel Base	8,000	Sq. Ft.	\$2.50	\$20,000	
Open Metal Fencing 7' High	360	Linear Ft.	\$50	\$18,000	
Sorting Chutes			ASSUME	\$40,000	
Sub-Total:					\$78,000
CORRAL	QUANTITY	UNITS	UNIT COST (\$)	COST	TOTAL
4" Sand Floor over 6" Gravel Base	30,000	Sq. Ft.	\$2.50	\$75,000	
Open Metal Fencing 7' High	800	Linear Ft.	\$50	\$40,000	
Sub-Total:					\$115,000
ANIMAL INFIRMARY	QUANTITY	UNITS	UNIT COST (\$)	COST	TOTAL
Interior Space w/ Office, HVAC	2,000	Sq. Ft.	\$200.00	\$400,000	
Equipment & Furniture			ASSUME	\$200,000	
Exterior - 4" Sand Floor over 6" Gravel Base	2,000	Sq. Ft.	\$2.50	\$5,000	
Open Metal Fencing 7' High	180	Linear Ft.	\$50.00	\$9,000	
Lighting			ASSUME	\$3,000	
Sub-Total:					\$617,000
PASTURE	QUANTITY	UNITS	UNIT COST (\$)	COST	TOTAL
Remains Natural Grade	85,000	Sq. Ft.	\$0.00	\$0	
Open Metal Fencing 7' High	1,200	Linear Ft.	\$50	\$60,000	
Sub-Total:					\$60,000

FACILITIES (CONTINUED)

MISC.	QUANTITY	UNITS	UNIT COST (\$)	COST	TOTAL
R.V. Site Hookup/Pad			ASSUME	\$6,000	
Entry Signage & Gates			ASSUME	\$10,000	
Panel Storage	400	Sq. Ft.	\$25	\$10,000	
Equipment Garage - No HVAC, Conc. Floor, Elec., H2O, Bathroom	1,000	Sq. Ft.	\$75.00	\$75,000	
Hay Storage - Tent Cover w/ Conc. Floor, Lighting, & Open Sides	800	Sq. Ft.	\$40	\$32,000	
Sub-Total:					\$133,000
Facilities Total:					\$1,908,000
Facilities, On-Site, & Off-Site Total:					\$3,005,000

CONTINGENCY			%	COST	TOTAL
Contingency			10.0%	\$300,500	
Sub-Total:					\$3,305,500

FEES			%	COST	
Contractor's Fee & General Conditions			15.0%	\$495,825	
Consultant's Fees			9.0%	\$297,495	
Reimbursable Expenses - 5% of Consultant Fees				\$14,875	
Sub-Total					\$808,195
TOTAL PROJECT COSTS					\$4,113,695
Note: Not included are land costs, construction interest, owner's insurance on-site maintenance equipment or vehicles (trailers, trucks, R.V.s, tractors)					

Appendix B

Sense of Place and Sustainable Design Concepts

(Adapted from the Oliver Ranch Feasibility Study, pp 87-94)

The environmental design concepts [to be incorporated in the ORSS complex] are broken down in the following categories: Site, Water, Energy and Air, and Materials. *The LEED Green Building Rating System™* and the *Energy Design for High Performance Schools in Hot and Dry Climates* were used as references in developing these concepts.

Site

At the early stage in the planning, most of the concepts focused on responses to the site primarily due to the macro scale at which the design team worked. The following concepts focus not only on preservation of the physical site, but also some of its history.

- Utilize pieces of the existing structures, especially the stone walls, as part of new buildings or outdoor rooms.
- Keep and utilize the benefits of the existing trees of the site, many of which are deciduous and will block out the intense summer sun, while letting in the winter sun.
- Utilize the already impacted areas of the site, such as the paths and flat pads, thus reducing grading, and retaining some memory of the existing ranch layout.
- Keep buildings within the existing boundaries of the immediate site to minimize impacting the surroundings.
- Preserve the natural spring and stream, which are only present during certain times of the year.
- Minimize the vehicular access at the school to reduce impact and maintain the sense of place. Vehicles will be limited to an entry drop-off point and parking in service areas. These vehicular areas will be located on the part of the site closest to the road. An attempt will be made to keep them primarily out of sight. Limiting vehicles on the site will reduce air pollutants such as fumes and dust.
- Collect and filter water runoff from the parking lot so as to not contaminate the site
- Create an entry area that allows for a period of adjustment for students to be oriented to their surroundings once they've arrived
- Minimize building footprints- smaller spaced out buildings reduce impact on the site. Maximize exterior spaces between buildings to take in the natural environment as much as possible. The feeling is to be of an outdoor school comprised of paths and places.
- Locate residential buildings on the portion of the site furthest away from the road, to avoid noise, to take advantage of views, and create a sense of emersion and security.
- Create indoor/outdoor connections by maximizing views and rooms that extend to the outside.

Water

Water is a precious resource in the desert and therefore it is essential to reduce, reuse, and recycle it. The following concepts will help reduce water consumption at the school:

- Incorporate native and drought resistant plants and xeriscape principals to reduce the need for irrigation.
- Build an onsite wastewater treatment plant (gray water system), which will recycle water from plumbing fixtures for non-potable reuse such as toilet flushing.
- Use water conserving plumbing fixtures to maximize water efficiency.
- Use non-flushing waterless urinals to reduce water utilization.
- Build ground water and rainwater monitoring stations.

Energy and Air

Designing buildings to reduce energy consumption is both an environmental issue, and a financial issue. Incorporating the following sustainable energy systems and concepts will dramatically decrease the operational costs throughout the life of the school:

- Orient buildings along an east-west access. Buildings should be rectilinear in shape with the long sides facing south and north. Maximize well-controlled south facing glass which will shield out the high summer sun and take in the low winter sun – this will provide natural day lighting within the buildings and will reduce the need for mechanical heating and cooling.
- Construct the buildings primarily of massive masonry walls rather than wood framing thus delaying thermal heat gains. Heat absorbed by the walls during the day will not penetrate into the buildings' interiors until the evening, thereby heating the building at night.
- Utilize natural ventilation and nighttime cooling strategies whenever possible to reduce and often eliminate the need for mechanical air conditioning – this also helps improve indoor air quality.
- Maximize day lighting in buildings. This reduces energy costs and it has been proven that naturally lit spaces increase learning in students.
- Utilize photovoltaic cells placed on the roofs of buildings to generate as much of the school's own power as possible. The power generated from the solar panels can be significant due to the desert climate. This system could be hooked up to the grid, which would allow the school to receive rebates from the power company for excess power generation.
- Consider the use of wind turbines on the school as a power generating option.

Materials

Selecting the proper materials with which to build the school plays a major role in creating a sense of place that is in tune with the desert ecology and the historical significance of the existing buildings at the school. Utilizing materials that are environmentally friendly us

also crucial to creating a sustainable school. It is important that the school also promotes an awareness of how the material waste was generated at the school impacts both the local and globe environment.

- Integrate and make very accessible recycling areas at the school.
- Use alternative methods, such as composting and fertilization for a greenhouse for food and waste disposal.
- Reuse existing buildings or parts of existing buildings for historical and environmental purposes.
- Use similar materials for the new structures as in the existing buildings so they integrate well with the old ranch and surrounding desert.
- Use materials of recycled content whenever possible.

When implementing all of these concepts, a concerted effort will be made to make them part of the learning experience – to teach how the built environment can be environmentally responsible.

Southern Nevada Public Lands Management Act
Capital Improvement Nomination
Round 5

Alternative Energy and Scientific Education
Infrastructure Improvements at Oliver Ranch

Contact Person/Project Manager: Angie Lara, Associate Field Manager, Bureau of Land Management, Las Vegas Field Office

Contact Person Telephone Number: 702-515-5043

Contact Person Email Address: alara@nv.blm.gov

Aggregate amount of Capital Improvement Nomination Funding Request: \$18,207,691

General description of the project (see nomination package for 8-1/2" x 11" map)

The Oliver Ranch Science School and Wild Horse and Burro (ORSS and WHB) capital construction project was approved in Round 4 of the SNPLMA Capital projects. This previously approved nomination will permit construction of the residential science facility, including classrooms, dormitories, kitchen/dining area, and much of the campus infrastructure. The main purposes of the facility are to **(1)** provide outdoor learning opportunities in a non-advocacy environment meeting the increased scientific education needs of students of the Mojave Desert region (largely represented by the Clark County School District, the 6th largest school district in the country with an enrollment of over 240,000 students); **(2)** promote stewardship of public lands in Southern Nevada, the Mojave Desert Region, and in arid environments in the United States; **(3)** develop critical thinking skills (both scientific and mathematical problem solving) of school attendees to allow them to make wise decisions about Nevada's and the related region's future; **(4)** provide a scientific education experience in the local environment that demonstrates methodology, strategy, technology and functioning systems that encourages and advocates for the transfer of these elements to local communities in the Mojave Desert and arid environments throughout the United States, to increase community awareness and effectiveness in environmental stewardship, resource conservation and community quality of life; and **(5)** fulfill the shared purpose of the ORSS and WHB program with the Bureau of Land Management. The shared purposes is to protect the nation's most remarkable and rugged natural landscapes, realize healthier and more productive public lands through better informed citizens who are willing to participate and assist in solving complex scientific problems within the environment, and incorporate a multiple use mission that takes into consideration natural resources such as wildlife and vegetation and other users such as livestock & recreationists for the WHB.

Although the original capital improvement project provides for construction of much of the conventional physical campus, the core mission of the school requires teaching about the Mojave Desert and using the sciences, strategies, technologies and systems that educate both students and the public about responsible and sensible habitation of the Mojave Desert and allow transfer of these elements into local communities to improve resource management and stewardship of our Mojave Desert environment and similar arid environments throughout the United States.

The Round 4 ORSS and WHB capital nomination requested funding for the design and construction of the necessary campus infrastructure systems that support the goal of sustainable-living knowledge integration and transfer to the ORSS student community. Construction of specific alternative energy and scientific education infrastructure elements were not included in the Round 4 nomination primarily because planning and consultation with knowledgeable people in key institutions had not developed far enough for a complete understanding of all of the campus systems required to achieve these goals. The Round 4 ORSS and WHB capital nomination did provide for some of these technologies more generally applied to overall design and construction strategies, but more sophisticated and inclusive discussions have occurred since that time. Various integrated ORSS and WHB committee teams have developed the design, construction, education and operations components to coordinate their efforts and refine the core vision and mission of the ORSS and WHB.

Over the past year, the ORSS and WHB Core Advisory Group has formed **(1)** an Education Committee, that includes members from Clark County School District and the University of Nevada Las Vegas, to develop the broad outlines of the educational programs and learning venues to support the mission of the ORSS; **(2)** a Design Oversight Committee (DOC) to develop a more detailed understanding of campus and facility physical needs and requirements to support the educational and operational goals of the ORSS; and **(3)** an Operations Committee to develop the operational strategies, an operations model, and a detailed understanding of the relationship of operating the ORSS and WHB and the resources required to meet the educational goals and to support the facilities, staff and on-going operations issues. Furthermore, additional committees have been formed that are investigating Alternate Educational Uses, Fundraising, Public Relations and other topics relevant to the collaborative process in effect for the ORSS process/project development. Participation on these committees includes, but is not limited to, representatives from the Bureau of Land Management (BLM), Desert Research Institute (DRI), University of Nevada Las Vegas (UNLV), Clark County School District (CCSD), Clark County Comprehensive Planning, Southern Nevada Water Authority (SNWA), Red Rock Conservation Interpretive Association (RRCIA), National Wild Horse Association (NWA), Outside Las Vegas Foundation (OLVF) and other knowledgeable and interested groups and individuals. Many in this group visited several leading environmental education schools throughout the United States, and others in the group have investigated many other outdoor education schools comparable to the planned ORSS. The Education Committee has met regularly to develop the broad outlines of the educational programming within the structure of the Clark County School District's curriculum to be implemented at ORSS and WHB, specifically focusing on identifying

the key physical construction needs to support the educational programming. The Education Committee will complete a document outlining their recommendations and intends this to be the scope of work for the operator to follow. The DOC Committee has been active in interfacing with the Education Committee to determine the challenges and needs of implementing the necessary identified key physical elements for the ORSS and WHB campus so that the scope of these elements is well defined and the funds and expertise necessary to design and construct these elements is properly represented in the project scope and budget. Committees addressing Operations, Fundraising, Public Relations, Wild Horse and Burro and Alternative Educational Uses also interface with the development of the educational master plan and all other committees to coordinate the variety of issues in ensuring the success of the ORSS and WHB.

All of the successful schools studied throughout the United States include critical design elements that support the activity of learning in both an academic and outdoor environment. In addition, they all include design elements that demonstrate real world resource management and responsible habitation throughout their facilities. The example set by the concept of 'practicing what one teaches' is vital to the success of the education program. The facilities at ORSS and WHB must not only support the activity of learning in the environment, but also must demonstrate through active engagement and real implementation how one may practice responsible living through sustainable design/construction and resource management in the Mojave Desert and in arid regions throughout the United States. In addition, teaching the children the science of these methods with direct access to the equipment can stimulate a desire for further research into these technologies away from the school.

The ultimate goal of this approach is not only to transfer knowledge but also provide working examples of sustainable design/construction and resource management that can be implemented in both the Mojave Desert and arid regions throughout the United States in local communities. The examples must have appropriately scaled implementation costs and be operationally effective on a local community and individual scale. They must demonstrate improved stewardship of the environment by the citizens of the United States, reduced resource consumption and improved quality of life on a broad measure.

Nomination Package Request Description:

The Round Five Nomination Package for the Environmental Education Infrastructure at the Oliver Ranch Science School Complex and Wild Horse & Burro Facility includes provisions for the following elements to supplement the Round 4 approved nomination.

1. Alternative Energy and Water Systems. This element includes; (1) a Solar Energy Generation and Storage System for a portion of the electricity generation/storage for the facility; (2) a Horse Waste Digester; (3) Water Harvesting Systems, and; (4) a Constructed Wetlands. All of these elements would have appropriate applications for the operation of the scientific education programs for adults and children. Within the water system, a 'Living Machine' would be provided to provide an on-going regenerative teaching and research venue for open and/or closed loop environmental system studies.

The approximate cost for the design, specification, purchase, installation and coordination of these systems is estimated at \$10,708,962. If well constructed, the adults and children who will witness and participate in the on-going operations of these systems will provide an avenue for the potential inclusion of such systems and technologies in their respective communities. The operation and maintenance of these systems will be the responsibility of the operator.

2. Fire Protection and Security Systems: The Oliver Ranch Science School Complex and Wild Horse & Burro Facility is located a significant distance from conventional utility systems and municipal fire protection systems. The facility will require a stand-alone and dedicated fire protection system to protect the health, safety and welfare of campus occupants, surrounding properties and the facilities on campus. Also, a security system is essential to maintain the safety and security of the facility occupants and users. These systems are intended to also serve as part of the environmental education program to demonstrate the use of purpose built fire protection systems that serve specific facilities using environmentally sustainable methods. The approximate cost for the design, specification, purchase, installation and coordination of this system is estimated at \$1,433,358. The operation and maintenance of these systems will be the responsibility of the operator.

3. Sustainable Vehicular Access System: It is essential that the campus entry include environmentally sustainable vehicular traffic surfaces for main campus access to primary entries, a campus visitor drop-off loop, emergency/service vehicle access and short-term parking. The purpose of this component of the facility is to both ensure the long-term sustainability, viability and maintenance of sensitive campus environs and to support the health, safety and welfare of campus occupants and the ongoing operations of the Oliver Ranch Science School Complex and Wild Horse & Burro Facility by providing access for both emergency and service vehicles. This sustainable vehicular access system is intended to limit the invasion of site modification for vehicular access to a minimum amount and to institute the improvements to reduce ongoing environmental impacts. The approximate cost for the design, specification, purchase, installation and coordination of this system is estimated at \$263,162. The operation and maintenance of these systems will be the responsibility of the operator.

4. Hardened Trail System: Establishment of an estimated 8.0 miles of hardened trails will avoid impact on sensitive species and other valuable resources, which might be damaged by the activities of students, visitors and staff. By careful design prior to opening, we will avoid negative impacts to sensitive landscapes and ecological communities, allowing students to learn from illustrative examples that are not irreplaceable. Trails will also be constructed in so far as possible on pre-existing roads or trails. The construction of these trails is essential to provide accessible outdoor educational experiences to people of differing physical abilities including those in wheelchairs. The approximate cost for the design, specification, purchase, installation and coordination of this system is estimated at \$2,223,197. The operation and maintenance of these systems will be the responsibility of the operator.

5. System of Shade Shelters and Teaching Structures: Construction of a total of an estimated 14 shade shelters/teaching structures is proposed. These structures will most likely include a Mormon Green Springs boardwalk/kiosk, riparian learning kiosk/structure near Wheeler Camp Spring and a teaching/shade structure at Oliver Hill topographic mapping area. Shade shelters/teaching structures may also be provided at the Wild Horse and Burro Facility. The remaining structures will be built at strategic locations along newly established trails to provide protection from the elements and situated near planned future learning venues. The approximate cost for the design, specification, purchase, installation and coordination of this system is estimated at \$859,665. The operation and maintenance of these systems will be the responsibility of the operator.

6. Outdoor Teaching-Learning Venues: Construction of some key outdoor teaching venues (see narrative question 3 for more detail). Examples of some venues might be:

- (1) Artificial Wetland Teaching Venue, which would be an extension of the re-used swimming pool/ "living machine" described above.
- (2) Outdoor Group Classroom/"Friendship" Circle.
- (3) Walk-through lysimeter
- (4) Oliver Hill topographic mapping feature
- (5) Environmental monitoring plots and controls

The approximate cost for the design, specification, purchase, installation and coordination of these elements is estimated at \$2,719,347. The operation and maintenance of these systems will be the responsibility of the operator.

Narrative Question One:

Does this project provide safety for visitors and/or employees? YES.

These proposed components of the Oliver Ranch Science School Complex and Wild Horse & Burro Facility provide safety for visitors and employees of the facility. The nature of the safety concerns include fire protection and security for the campus and its occupants and emergency vehicle access to provide emergency services to campus occupants in the instance of a medical or life safety emergency incident. The urgency and risk of these concerns is significant due to these components ability to suppress and mitigate incidents relative to fire safety and security and to ensure proper emergency services personnel and equipment access to the campus and its elements in the instance an emergency is determined to exist. Student, visitor and staff safety will also be significantly enhanced by the provision for hardened trails. The hardened trail system will reduce the challenge level of basic trail utilization, reducing tripping and straying from established hardened trails. Also, the demarcated hardened trails will protect the desert environment and reduce occupant overlap with desert flora and fauna, protecting these elements and keeping occupants from interacting with potentially harmful elements. Shade shelters/teaching structures also impact student, visitor and staff safety by providing designated areas on hardened trail systems that allow for shelter from solar and thermal elements of the desert environment when necessary to protect occupants during

extreme conditions and to allow educational activities to occur without putting occupants at significant risk. Furthermore, the infrastructure improvements that extend the educational capability of the facility will enhance the ability of the ORSS and WHB educational curriculum to focus on transferring knowledge on how citizens can inhabit the Mojave Desert and arid environments in an appropriate and safe manner. The entirety of the campus community, including visitors and employees will be positively impacted by these proposed improvements. Additionally, the health and welfare of the wild horses and burros will be positively impacted by these improvements. At this time, the number of affected employees and students/visitors may be approximately 7,000 annual visitors. There is no alternate remedy or alternative to these systems, as they are fundamental to the health, safety and welfare of the campus occupants.

Narrative Question Two:

Does this project provide more and better visitor facilities to meet increasing demands and changing demographics? YES.

The stated components are instrumental in providing better visitor facilities to meet increasing demands and changing demographics. In addition to directly addressing visitor and employee safety in this nomination, the components also provide operational systems to improve energy efficiency and provide educational opportunities in the use and implementation of energy efficient sustainable systems for campus operations. These components directly relate to environmental education and extension to communities in the Mojave Desert and arid regions of the United States, as well as the welfare of the wild horses and burros. In addition, these components have direct bearing on translating relevant and applicable systems, technologies and strategies for sustainability to the communities relative to the arid regions of the United States. Consequently, the demand for facility use will be high and have regional significance. The demographics of the visitors extend to the entirety of the Western Region of the United States, with a range of visitors including but not limited to both secondary and higher education students and private citizens, government entities and corporate entities. The potential impact to a broad variety of demographic groups extends broadly between age groups, cultural backgrounds, socio-economic levels and urban/sub-urban/rural communities. Additionally, the infrastructure improvements relative to trails, shade structures at learning environments and wetlands teaching environments will address a broader demographic of student and visitor by providing greater access to a varied experience with a holistic approach to learning in the environment. The anticipated student/visitor carrying capacity for the campus is approximately 7,000 impacted visitors on an annual basis.

Narrative Question Three:

Does this project provide more and better information and education services and opportunities? YES.

The components of this nomination package provide more and better information and education services and opportunities. The implementation of alternate energy systems has a direct and positive relationship to the educational outreach program and services provided to the visitors related to an environmental education setting. Information available to visitors and incorporated into the educational programs relative to alternate energy systems will increase the technology and sustainability knowledge transfer to communities in the Western United States through the examples of system implementation and operation. The sciences surrounding the protection of wild horses and burros will be improved significantly by the provisions of this nomination. Furthermore, the infrastructure improvements relative to trails, shade structures at outdoor learning environments and wetlands teaching environments will both extend information and education services and opportunities and provide a significantly greater outreach to a broader audience. The ORSS and WHB Team has identified a number of physical locations within a 2.5 mile radius of the ORSS and WHB campus that provide the best illustrations of key concepts to the student population. By providing the trail and shade structure improvements, these educational opportunities can be capitalized upon while minimizing encroachment impacts to the desert environment. Some specific examples of these teaching venues are:

- **Artificial Wetland:** It is anticipated that this living teaching venue would be designed to allow students to get in and get their hands and feet dirty, sampling plants and animal species “stocked” in the wetland in several different built ecosystems. We imagine different solid substrates, with different exposures and plant types. Students would be actually discovering how different combinations of soil and water and light affect growth and survivability of organisms. The wetland would be re-stockable, and also could be the central teaching venue for lessons on restoration of spring and other riparian habitats.
- **Walk-in Lysimeter:** Lysimeters are devices used for measuring water use by vegetation and water quality. If possible ours will be “walk in” weighing lysimeters (possibly a trench cut 6 feet or so deep flanked by exposed faces on each side) showing soil moisture and water movement under a variety of different soil types and water regimes. These will have exposed Plexiglas faces so students can see a 6 feet deep cut of soil and see how different plants root structures develop. These lysimeters will demonstrate water use of different plant covers such as typical fescue turf compared with xeriscape design for example.
- **“Oliver Hill” Topographic Mapping Area:** An outdoor topographic mapping exercise is an important element of science education. We anticipate locating a small conical hill within the walk radius of ORSS and WHB (perhaps several hundred feet high) and build accessible trails and topographic control points on the hill to permit students to construct their own topographic map. A shade structure/shelter is anticipated to be on or near this topographic feature.
- **Long-Term Ecological Monitor Plots and Control Area:** (both on and off-campus) Monitoring of the environment is a key resource management tool and

will also be used by students and teachers to learn about the impacts of humans on the environment. We propose to place ecological study plots (analogous to some of the wild horse and burro “exclosures” already present in a few places at RRCNCA) in several key locations on different substrates and slopes and monitor indicator species of plants and animals (no rare, endangered, threatened, or watch list species). These will include study plots for plant species and different study plots for animal species (these may include vertebrates such as lizards and insects such as ant species). These plots will be near trails, roadways, or other places of human activity. Control plots will also be established. These control plots will be fenced to prevent humans, horses, or wild burros from interfering and will be established for long-term monitoring (>20 years).

- **Outdoor Group Classroom/’Friendship’ Circle:** Evening campus community programs are a vital element of the learning experience at residential science schools. Instructors lead students in group activities related to team bonding, stewardship, and other relevant activities. We will construct a “friendship” circle seating up to 120 people protected by a shelter on campus.
- **Hardened Trail Development:** We expect up to 10,000 students/visitors a year to visit at least some of the teaching venues identified above, plus additional older students, adults and people of differing physical abilities. Hardened constructed trails will be needed to allow this kind of use. We estimate that about 8.0 miles of hardened trails will be needed. These trails will help prevent damaging impacts to surround ecosystems by confining foot traffic to established trails. These trails will be ADA accessible. It is anticipated that trails shown on the map are purely conceptual; final routing will be established through careful review of topography, sensitive areas, and use existing disturbed areas as much as possible. Trails will be made of a durable materials be at least 6’ wide, and have a forward slope of 5% or less and a cross slope of 2% or less. Trails off-campus will not be lighted. Shade structures (combined with teaching venues where appropriate) will be established on the longer routes.

Narrative Question Four:

Does this project protect the integrity of significant resource values or improve the quality of the environment? YES.

The components of this nomination package expressly protect the integrity of the significant resource values and improve the quality of the environment. Alternate energy systems provide clear benefit to reducing the facility’s dependence on non-renewable resources and reduces the requirement to implement non-renewable resource distribution systems to the facility and within the facility. This facet of the nomination assists in reducing the impact of improvements relative to the facility that impact the surrounding environs. The fire protection component of the nomination is integral to preserving the

integrity of the environment and the facility in situations of fire encroachment. Sustainable service and emergency vehicular access systems both maintain a limited impact to the entirety of the environmentally sensitive land and provide a system of vehicular circulation that minimizes impact beyond designated pathways for vehicles, reducing pollution, erosion and impact to land and campus sites that would be degraded by more extensive and less sustainably planned pathways.

Regarding site infrastructure improvements relative to the educational programs and curriculum, a variety of general protection measures were described in the original ORSS and WHB nomination funded in round 4; here we describe those elements specific to the proposed teaching venues and trail system.

According to the General Management Plan, the RRCNCA hosts two federally - listed threatened and endangered species, and 43 other species of concern. The presence of these species will require careful management to avoid student impact, but the fact that the RRCNCA contains such important species provides powerful learning opportunities for students. Despite the heavy usage of the ORSS and WHB envisaged and other areas within the walk radius of the ORSS and WHB campus the proposed project develops a number of facilities and processes to insure the long-term integrity of important resources in the RRCNCA. We are convinced that by learning first hand about their neighborhood through programming at the ORSS and WHB, students and adults will be powerful protectors of RRCNCA and the Mojave Desert region. The advantages of this long-term benefit far outweigh the minimal impact we foresee from the operation of the school.

Nevertheless, we are taking a number of significant steps to minimize our own impact, and others to continually monitor our own impacts, based on the campus infrastructure improvements identified in this nomination package. These precautions include construction of an artificial wetland for teaching (described above), the system of hardened trails, and a network of ecological control plots and other environmental monitoring to maintain pre-ORSS and WHB conditions.

The artificial wetland concept is being adopted to balance protection of natural wetland/riparian areas with the need for inquiry-based activated by the students. By constructing a teaching wetland we will avoid serious impact to the precious riparian areas of the RRCNCA. Students will conduct experiments and observation, get dirty, collect samples from our constructed wetland, avoiding these kinds of invasive activities on the sensitive riparian areas. Programming will certainly involve visitation and observation of natural riparian areas, but these will be far less invasive and will not allow collection of specimens for example.

The constructed wetland will also be used as an on-going restoration project. UCCSN faculty and others will use this area as an experimental test bed to test and monitor how best to restore disturbed riparian areas to their natural state. The wetland will consist of a number of treatment plots, demonstrating sustainable processes and plant/animal communities that can then be transferred to Mojave Desert region and other arid regions in the United States.

Establishment of hardened trails will avoid sensitive species or other valuable resources, which might be damaged by student impacts. By careful design prior to opening, we will avoid sensitive landscapes and ecological communities, directing students to illustrative examples for learning that are not irreplaceable. Trails will be constructed in so far as possible on pre-existing roads or trails (suitability of the teaching venues however, will ultimately control where they and their trails are placed).

Long-term environmental monitoring will be a key component of the educational programming of the ORSS. This monitoring will provide data useful for research, provide a way to keep students engaged in discovery, and generate significant data of real use to land managers. It will allow measurement of impacts on the landscape by humans, including those impacts attributed to the school itself. The environment will be monitored in a number of ways using a variety of instruments. Air quality will be monitored through a haze monitoring station and a number of ground water wells will be bored for monitoring ground water quantity and quality (provided in the round 4 request). This proposal requests funding to establish ecological study plots near ORSS and WHB activities and comparable control plots away from ORSS and WHB activities. Data on plant communities and animal communities will be collected every year (and possibly many times each year) by students of all grade levels. These data are of more than just academic interest—they will be used to re-locate activities or mitigate any adverse effects that are seen from ORSS and WHB activities, and the results will be incorporated into students learning.

Narrative Question Five:

Does this project improve the efficiency and effectiveness of natural resource management activities? **YES.**

The components of this nomination package improve the efficiency and effectiveness of natural resource management activities. The use of alternate renewable energy systems mitigates extensive need for non-renewable resource supplies to operate the campus and reduces the need for infrastructure specific to non-renewable resources that impact the campus land and potentially land beyond the campus. The use of on-site fire protection systems also reduces the necessity for fixed utility corridor infrastructure that impacts the campus site and land beyond the campus. The ability to provide fire protection systems that relate closely to the need and service requirements of the campus allows resource management to very closely follow and serve the needs of the campus in an effective and efficient manner. Sustainable vehicular access systems limits impacts of vehicle access to a small percentage of site improvements and increases efficiency and effectiveness of resource management by providing a small area of active management relative to the entire site, resulting in reduced overall impact to the site in initial improvements and reduced need for on-going management of resources by limiting the scope of improvements to be managed.

Narrative Question Six:

Does this project involve partnership in the funding, design, construction, operation, and/or maintenance (other than SNPLMA sources)? **YES.**

All of the partners identified in the round 4 nomination for ORSS and WHB will assist in this project, as well as others (for details see the round 4 nomination package). These include the Outside Las Vegas Foundation, the Red Rock Canyon Associations, Clark County School District, Equine Associations, UCCSN Institutions, the local scientific research community, and a variety of non-SNPLMA federal planning organizations (NPS Denver Service Center, BLM's STC), among others mentioned earlier in this nomination package.

Narrative Question Seven:

Does this project have the support of state, local governments, interested parties and/or other agencies? **YES.**

The project meets both multi-agency goals and has multi-agency support. The National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management and the U.S. Forest Service believes the proposed teaching venues and linking trail system will support the ORSS and WHB mission and achieve their common goals of resource protection, environmental interpretation and education. The educational programs implemented in these venues combined with the on-campus programming will play a key role in accomplishing these goals by greatly expanding the opportunities for environmental education and by expanding the opportunity for partnership between the federal agencies and the private sector. Various environmental, educational and scientific organizations have expressed support for this project (See letters of support provided in this nomination package.) These organizations include the Clark County School District; Friends of Red Rock Canyon; University of Nevada Las Vegas; Desert Research Institution; University of Nevada Cooperative Extension; National Wild Horse Association and the Barrick Museum of Natural History Faculty, staff and professionals from the above organizations have already donated their time and expertise to help complete the feasibility study. In addition, UNLV has provided furnished office space, telephone and Internet services, and a computer as well as meeting space.

The Friends of Red Rock Canyon have also donated \$10,000 to help fund the study and have pledged an additional \$10,000 for environmental education scholarships for at risk students.

Narrative Question Eight:

Does this project have other considerations? **YES.**

This project has been carefully considered to address an urgent need for environmental education in the Mojave Desert region and for arid regions in the United States. No venues currently exist for this educational purpose based on past research of existing

environmental schools in the United States. A critical and urgent need for this type of education and facilities to support the sciences and mathematics has been identified in Nevada, particularly within the Clark County School District, the 6th largest school district in the United States, with an enrollment exceeding 240,000 students. The urgent need is so significant that the Friends of Red Rock Canyon have donated \$10,000 to help fund the study and have pledged an additional \$10,000 for environmental education scholarships for at risk students.

Furthermore, this nomination application has been coordinated to extend the educational impact of the approved Round 4 ORSS and WHB nomination package. The synergy provided by the consideration of the elements proposed in this nomination package with the Round 4 nomination approval and the concurrent Round 5 Conservation Initiatives nomination package will extend the educational resources and impact of the ORSS and WHB facilities. In addition, the students' interest in and ability to learn the scientific aspects of various technologies and methodologies will improve with the direct connection to the infrastructure improvements providing for within this nomination.

Ultimately, it is the impact on the children, students and visitors that will participate in the scientific education activities that drive the ORSS and WHB program and facility that makes this nomination particularly worthy of consideration and approval. Providing a broad educational experience that focuses on science and mathematics, but also includes all other disciplines, to a diverse demographic of children, students and visitors is at the core of the ORSS and WHB mission and purpose.